APRIL
1948

PESTS

and their CONTROL

PCO Charles Pomerantz shows Paul Muni a bottled rats specimen after DuPont Broadcast (See page 18)

MAGAZINE OF THE PEST CONTROL INDUSTRY

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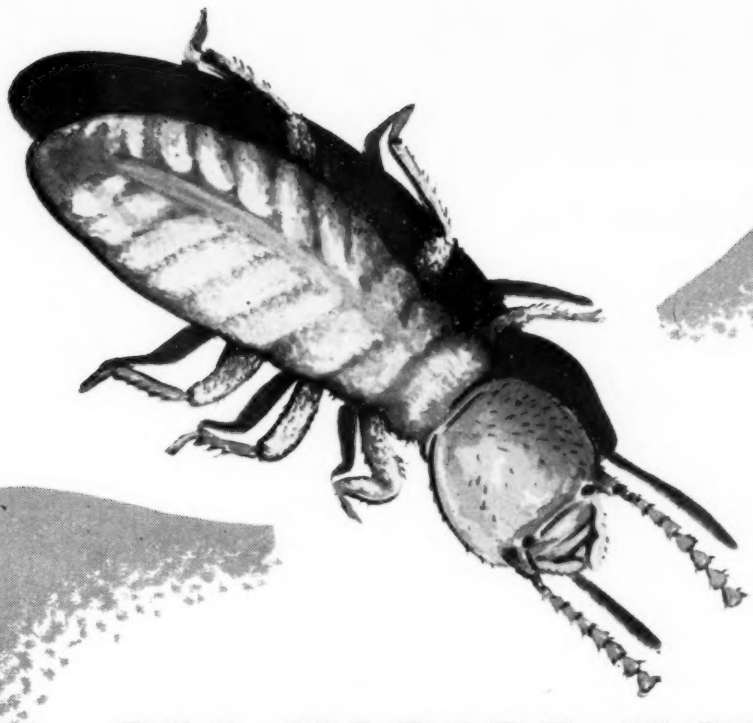

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PESTS and Their CONTROL

JAMES A. NELSON
Editor

Cooperating with

NATIONAL PEST CONTROL ASSOCIATION

Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of material pertaining to pest control and pests from those interested in the advancement of the field.

All contributions must be in our hands by the 15th of the month preceding issue for which they are intended.

EDITORIAL and BUSINESS OFFICES

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Pest Control with SOUND WAVES

Ultrasonics as a possiblity in the future of rodent and insect control

By HUBERT FRINGS

Department of Zoology and Entomology
Pennsylvania State College

CONSIDERABLE publicity is being given now to new uses for sound waves which are inaudible to the human ear, the so-called supersonic or ultrasonic waves. They can be used for cleaning clothes, discovering flaws in metals, locating underwater objects, homogenizing milk, killing bacteria, precipitating smokes, and producing emulsions, to mention only a few uses. Because of some of the special properties of ultrasound, and chiefly because ultrasonic waves cannot be heard by the human ear and can therefore be used in intensities which would be painful to man if in the audible range, these particular waves seem to have some interest for the future of the pest control industry.

First, let us place ultrasonic waves in their correct place. They are, like ordinary sound waves, waves of alternating compression and expansion in some substance. We usually think of sound as travelling in air, but these waves travel just as well, if not better, through liquids and solids. Since sound waves do consist of regions of compression and expansion, they can compress and decompress an object which they strike, and they are thus able to do work. We say that they have an energy content.

Waves may differ from each other in various ways, but three ways in which they may differ are of importance for our consideration here. First, they may differ in the speed at which they travel. For instance, sound waves travel more rapidly in solids than in gases.

Second, they may differ in the amount of compression and expansion of the material through which they are travelling, that is, they may differ in amplitude. Since the extent of compression and expansion is bound up with the energy content, the greater the amplitude in general the greater the energy. In human terms, amplitude is expressed as loudness or intensity, when the sounds can be heard. If the air particles are moved but slightly by a vibrating sound-producer, the waves have a small amplitude, and we say that the sound is not very loud. But if the air particles are moved considerably, the amplitude is large, and then we say that the sound is very loud.

Third, waves may vary in frequency, that is in the number of waves in a given time, let us say per second. There is related to this difference a difference in the wave-length, that is the distance between neighboring compressions, such that low frequencies are long wave-length and high frequencies are short. To us, differences in frequency mean differences in pitch or tone. Low frequencies, let us say about 100 cycles per second, we call low notes or bass notes. High frequencies, let us say about 5000 cycles per second, we call high notes. There is a lower limit of frequency below which the waves come too few per second to register in our ears as a sound. This is about 20 to 30 cycles per second. At the other end of the line, there is an upper limit of frequency above which the waves come too many per second for our ears to receive. This is about 16,000 to 18,000 cycles per second. Above these frequencies, the waves are said to be ultrasonic. Ultrasound waves, then, are like ordinary sound-waves, but there are simply too many waves reaching us per second for us to hear them.

High Frequency Sound Waves

JUST a word should be inserted at this point about the term, ultrasonic. You may have heard the word, supersonic, used to refer to these silent sound waves, and here I am using the term, ultrasonic. Supersonic was originally used in America to refer to these waves, but the aeronautical engineers have taken over the term to refer to speeds greater than the speed of sound, and so they speak of supersonic speeds of flight. Since the term is now fairly well established for this use, it seems best for the term, ultrasonic, which was used in Europe, to be imported for the designation of sound waves of high frequencies, leaving supersonic to refer to speeds. Thus confusion, such as is occasionally seen in popular articles in which the two ideas are hopelessly confused, can be avoided.

Ultrasonic frequencies of sound waves are produced by various means. In air, they can be created by whistles, such as the Galton whistle which is used as a silent dog-whistle, and sirens. In liquids or solids, they are usually produced by magnetostrictive rods, which are metallic rods caused to vibrate back and forth in their long dimension by alternation of

electric currents in wires surrounding them, and piezo quartz crystals, which vibrate when acted on by alternating currents. Since it is far easier to produce ultrasound waves in liquids and solids than in gases, their behavior in liquids and solids has been most studied so far.

We might ask why one would have hope that ultrasounds in air may be useful in pest control. As a start toward answering this, we may ask whether animals themselves can hear these waves, even though human beings cannot, and whether any cases are known of animals utilizing ultrasonic waves.

Ultrasonic Insect Sounds

MANY animals can actually hear ultrasounds. In other words, the upper limit of human hearing is not the upper limit of hearing for lower animals. Thus dogs and cats can be called by ultrasonic whistles which are inaudible to the human ear. Bats and mice are also known to hear in the ultrasonic range. Many insects, such as crickets, katydids, grasshoppers, and the like, produce sounds which have been found to be near or even entirely in the ultrasonic range. Since it seems probable that these sounds produced by the insects serve as a signalling system, male to female, they must also, be received by the insects.

Pumphrey, an English physiologist, has suggested that for insects the ultrasonic waves may actually serve, like radio frequencies in radio broadcasting, as carrier waves on which are modulated lower frequency waves, just as the audio frequencies are modulated on the radio frequencies in commercial radio. The small size of the insect hearing organ, he believes, makes it capable of receiving only short waves, that is high frequencies, but the insect ignores these waves, so to speak, and responds to lower frequency waves which are modulated on the carriers. If this is true, we have in the insects the essentials, in sound waves, of the standard broadcasting method — a characteristic carrier frequency, for which the receiver may be tuned, and a variable lower frequency which is the item of final interest.

Bats not only hear ultrasonic waves, they actually utilize them as a form of radar to guide them in their nocturnal flight. Galambos and Griffin, at Harvard University, have shown that bats squeak about 30 to 50 times per second while flying, the squeak being ultrasonic, with a frequency of about 50,000 cycles per second. If there is no obstacle in the bat's path, these squeaks simply fly off into space, but if there is some obstacle in the way, the squeaks rebound as echoes from it, and the bat picks them up with its delicate ears. Apparently by noting differences in intensity in the two ears and differences in time taken for the sounds to rebound, the bat is able to locate obstacles by echoes. With this system of echolocation, similar to radar and to the system used by blind people who tap with a cane and thus probe their surroundings, the bat steers its course after dark without collisions, using sound waves which to us are entirely silent.

These are cases, then, of animals using ultrasounds. But what effects do ultrasonic waves have on animals which do not directly use them? If the animals hear them, are the sounds attractive or repellent? If the ultrasonic waves become intense, can they injure the animals? In other words, what are the known psychological and physical effects of ultrasonic waves on animals?

Ultrasounds Repel Insects?

IN THE press and by the grapevine, anyone interested in ultrasonics and biology discovers a widespread belief that ultrasonic frequencies can be repellent to various insects, such as mosquitoes, and to birds, such as pigeons. News reports appear, with regularity, describing the efforts of some city or some individual to rid public buildings of starlings or pigeons using ultrasonic waves. The reports are usually favorable for the ultrasonics. These are often difficult to trace. Dr. Schilling, of the Acoustics Laboratory of The Pennsylvania State College, for instance, has tried to find the facts behind many of these reports, and has yet to have much success. Either the city fathers of the city which was reported using ultrasonics know nothing about it, or the individual who supposedly has the answer writes evasive letters which clearly show that, no matter how sincere he was, his efforts were far overrated.

As of the present moment, despite the reports in the press, we know of no clear-out demonstration of repelling birds by ultrasonic waves. At the Convention of the N. P. C. A., I stated this unequivocally, and asked that, if anyone knew of a case, he would bring it to my attention One such was called to my attention, but my attempt to follow it up and get the details has simply developed into a waste of money for postage stamps.

While working during the war for the Army Chemical Service, I heard reports from men who had been in Canada, Alaska, or some tropical countries of the repelling of mosquitoes and other blood sucking pests by sounds produced by various items of heavy equipment — tanks, bulldozers, etc. The suggestion was that some component of the noise produced by these devices was repellent to the insects. None of these observations was exact. The persistence of the reports, however, makes it seem possible that there might be some frequencies or combination of frequencies — possibly in the ultrasonic range — which are repellent for mosquitoes, flies, roaches, and other vermin.

In some white rats, the sound of a hissing air-jet, or a loud buzzer, or jingling keys will produce a fit resembling epilepsy. Preliminary work with known frequencies has shown that the frequencies most effective in bringing these fits on in susceptible rats are ultrasonic. You will note that it is only some of the rats which develop these seizures — audiogenic seizures, they are called technically — and this fact has led to considerable argument as to their real basis. Some workers believe that they result simply from exposure to sound, others believe that fear or frustration of the rats are involved, while still others believe that the seizures

FIGURE 1

The mouse on the right is a normal specimen. The one on the left has lost his external ears as a result of ultrasonic treatment.

only take place in rats which are deficient in certain vitamins. To support the last idea, tests on wild rats have shown that the seizures do not develop in these. Wild rats, however, are reported as attacking the sound sources, so apparently the sounds have some effect on them. It certainly seems not too far fetched to believe that, if a sound will produce a fit in a rat, the rat, given its freedom, will not come near the sound. In short, we have here a possible repellent for rodents. I should say that so far my own tests with white mice have not given any indication that mice are subject to these seizures, though they do seem to be agitated by sounds of about 25,000 cycles per second, obviously hearing them.

Waves Kill Small Animals

NOW what about the physical effects of ultrasound waves? The first person apparently to notice effects of high intensity ultrasonic waves on animals was Langevin, a French scientist, who, in 1917, while investigating the use of ultrasonic beams for the location of submarines, noted that fish and other marine life that got in the powerful sound-beam were injured by it. Wood and Loomis, at Tuxedo Park, New York, made the first careful studies of the effects of ultrasonic waves in water on animals, and reported their findings in 1927. They found that small animals exposed to these waves were killed and that cells were destroyed, in short, that ultrasonic waves of great intensity in water were quite destructive to living things.

Following this pioneer work, numerous investigators have studied the effects of ultrasonic waves in water on living micro-organisms, such as yeasts, Protozoa, bacteria, algae, and other biological objects, such as blood cells. They have uniformly found them quite destructive, and much of the work has had as it purpose determining the reasons behind the destructiveness of the ultrasounds. Out of these studies have come methods for pasteurizing milk without heat, sterilizing foods without heat, extracting substances, such as toxins or enzymes, from cells by breaking them up without heat, and even activating yeasts by short treatments, thus making fermentation proceed more rapidly.

Exactly what action the ultrasonic waves have on these cells is still a matter of some debate. That they have powerful mechanical effects cannot be doubted, and the mere vibration of particles or breaking up of particles in the cells might bring about the effects. But ultrasonic waves have other effects as well. They cause lumping of particles, if the particles are of the correct size, and this may be of importance. They also cause gas in solution to be discharged in the form of bubbles. This is called degassing or cavitation, though the latter term strictly is the tearing apart of the liquid leaving tiny cavities which fill up with gas and thus form bubbles.

That the formation of bubbles in living cells can be harmful is well known, and so degassing might bring about the injury, or the violent agitation of the gas bubbles by the sound waves after they are formed might prove harmful. Ultrasonic waves, however, are also absorbed by substances in the cells with the production of heat. This, of course, is dangerous to a living cell. It is probable that all of these dire events occur simultaneously in the cells being treated with ultrasonic waves and which one brings about the destruction is a question of which one "gets there fustest with the mostest."

Waves Produce Heat

FOR pest control work, however, the lethal effects of underwater waves are merely of theoretical interest. What about ultrasonic waves in air acting directly on air-inhabiting animals? In the Acoustics Laboratory at Penn State, we have carried out the first experiements in this field, with some startling results. The work was carried on by Drs. Allen and Rudnick, of the Physics Department, and by myself.

We used a powerful siren, designed and built by Drs. Allen and Rudnick, which is capable of producing sound waves in both sonic and ultrasonic ranges, that is, those that we can hear and those above the limit of hearing. The intensities obtainable with this little giant, however, are unbelievable. In acoustic terms, the siren produces waves of 160-165

Continued on Page 44

INSECT CONTROL in SUMMER CAMPS*

By CLIFFORD W. WEISS

EXPERIENCE in fly and mosquito control at children's summer camps — the dictionary defines *experience* as a "Skill or knowledge gained by continuous work and study" — and since flies and mosquitoes are seasonal in our northern climate, control work is limited to the summer months, during which time school is vacationing. It was during these vacation periods that I have had the good fortune to get into this branch of pest control with my father's firm, the "All Westchester Exterminating Corp." of Mt. Vernon, New York.

Like most pest control operators our firm did very little in the field of pest control in summer camps until DDT came on the scene. Since then we have built up a sizeable business in this field of work. Two years work with DDT in the control of these annoying and dangerous pests in this specialized field, where safeguarding the health and comfort of thousands of children is at stake, has given us a considerable fund of knowledge of its accomplishments and value. We have also acquired a degree of skill in treatment that now enables us to give our customers better than 90 per cent control during the camping season. I think therefore that we are fulfilling the definition of *experience* namely, "skill and knowledge gained by continuous work and study."

Now as to my participation in this work. Being the son of a practicing pest control operator, it was but natural that I follow the lead of my brother, and join my father's organization in the work it is doing in the development of new fields for the business. My brother did pest control work in the U. S. Armed Forces for four years and had the experience of daily use of the then "wonder chemical," DDT. He was fortunate in getting this early start in its use, and it gave him ideas to bring back to the firm on his discharge from the Army. His glowing reports of its accomplishments in Army use certainly had everyone at the shop itching to try it on the next bedbug job.

Clifford Weiss is one of the sons of a PCO: his father operating the All Westchester Exterminating Corp. in Mt. Vernon, New York. Our author is taking the four year course on pest control initiated by Prof. J. J. Davis at Purdue University, Lafayette, Indiana, four years ago. This paper was one of those read by students before the state PCO meeting at Purdue this January.

No one in our organization then visualized its possibilities in fly and mosquito control as an adjunct of the pest control business. Then came "DDT Day" and we mixed our first batch and tried it. It worked wonderfully. Some say it worked too well and the lament now is no more fumigating jobs. Gone are the good old HCN days?

But we had an idea and a new plan. Why not go into the field of fly and mosquito control at children's summer camps? They needed us badly and really welcomed our help. In the East, many middle class families as well as charitable institutions consider it a *must* to send children away for the summer from the sidewalks of big cities to well organized camps. There are said to be about 3,000 of these camps distributed in the state of New York, New Jersey, Pennsylvania, Massachusetts, Vermont, New Hampshire and Maine. These camps are located in picturesque areas, on the shores of fine lakes surrounded by woods and dales. But they are also surrounded by a complete category of annoying and and dangerous pests that make life miserable for the personnel and children at camp. They have their full quota of mosquitoes, flies, gnats, midges, deer flies, etc.

At the start of our work we found that the great majority of camp directors knew very little of the life history and breeding habits of these camp invaders, and scant knowledge of some elementary sanitation practices that would help in cutting down their breeding. So we made our plans for a thorough study of the topography of these camps, construction of buildings, garbage disposal, etc. We found plenty for us to do, both in education for the responsible camp personnel, and in control work. Our initial work necessitated interesting a group of these private camp owners in what we had to offer, and then arranging a course of lectures and demonstrations to bring home to them the breeding habits of their insect invaders, plus our control methods. Following this we went to each camp and made a detailed study of the situation that existed in their immediate area. This carefully planned procedure soon paid dividends.

May I repeat that control consists of two equally important parts, namely (1) sanitation and (2) proper application of DDT. In many cases we found a lack of

* Talk before Indiana Pest Control Operators' Association, Purdue University, Lafayette, Ind., Jan. 10, 1948

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good sanitary practices. For example, one large and important camp which we serviced made a practice of dumping their empty food tins in a great heap not far from the camp area. Upon picking up some of these empty rusty tin cans in different parts of the heap we found what we had expected. About an inch of stagnant rain water with plenty of eggs and wiggling mosquito larvae. It was only the middle of April, but insect life was stirring. Here were fine foci for a continuous summer supply of these pests and the camp director did not know he was doing his share in building up hordes of these hard biting devils on his home grounds.

We taught the camp personnel how to dig a long trench and bury these tin cans, and the importance of never again exposing them as had been done. At other camps, where they had horses, it was a common practice to dump the manure outside of the stables, with no understanding of proper composting. It was not hard to understand that here too was a heaven for fly breeding. Taking a page out of a Army Manuel, we taught them the correct way to compost manure and reduce fly population which had made a beeline from the manure to the food in their kitchens. We added other suggestions such as correct screening, treatment of swampy and wet low areas with a good larvicidal DDT spray every two weeks, and our own professional application of a residual DDT to all habitable buildings. The net results of all this were gratifying both to us and to the camp owner.

The camping department at our shop is organized somewhat along these lines. There are a number of crews specially trained for this work under the guidance of competent foremen. These men are fully familiar with DDT, the proper technique of its application, fire hazards, care of equipment safeguarding of their health. The foreman of each crew makes a personal study of the group of camps he is servicing, and is familiar with all details of the plans for the job. During the first season engaged in this work, we operated rather crudely, using only the regular four-gallon Hudson Industrial Sprayers. Many a canful of DDT I dragged from the supply point to the building where I was spraying. It was back-breaking work; filling, pumping and spraying. We leave nothing undone, each wall, ceiling, even electric pull cords are treated.

There are many buildings in a camp, such as the social hall, mess hall, sleeping bunks, kitchens, store houses, nature study halls and stables to be sprayed and it is a long routine to take care of them all. The work at some large camps requires two and three days of a full crew's time. We finished the first season with flying colors. All work has to be completed by the end of June when the children arrive. At the end of July, my father and brother started out on a good-will tour of the camps we had serviced to check results. With but few exceptions they were received with a warm welcome. This was their first experience with what DDT could do for their insect pests and they were highly appreciative of the results we had shown them.

The following fall we began working on new ideas and bettering our methods for the second summer season. First of all we had to consider the labor problem. It required improvement. So with a little engineering advice and a few ideas of our own we designed a simple gasoline powered spraying unit. This is equipped with a fifty-gallon tank, two long lengths of oil resistant hose and several gadgets we thought up, all mounted on a trailer attached to a Jeep. We had several of these built at a local machine shop and they performed excellently through last summer. We use a three man crew with each unit. The foreman runs the engine, regulating pressures, etc. and directs the job, while two service men do the spraying inside the buildings. I have worked with a crew directed by my brother, and have gotten some real first hand experience which has been most interesting and instructive. I can attest to the fact that with these new power sprayers we have gotten far better coverage, reached greater heights in high buildings, and finished a day's spraying with less backache. The second season's results were better than our initial try the first summer.

While we have learned much and are gaining experience, we still have a few hurdles to overcome such as better outdoor control of deer flies, gnats, midges, etc. We hope that by study, experimentation, and perhaps the use of newer and better spray materials we shall get greater control each season.

Did You Know That----?

Some fascinating facts about insects and spiders

BY MARGARET CRAWFORD UDINE

(Some time ago Margaret Udine, wife of E. J. Udine, Extension Entomologist, Pennsylvania State College, compiled a list of curious facts about insects and their relatives for Dr. Heber C. Donohoe of William Peterman, Inc., who has passed some of them on to Pests. They present a fascinating side of entomology that may be little known to Pest Control Operators. — Ed.)

DO YOU know that one type of spider spins itself a diving-bell for going under water, or that a spider, the geometrical wizard at building a web, can not repair it? One type of spider fashions its web into a lasso and "ropes" its prey.

Many spiders use their webs as telegraph wires and listen for the approach of their victims. By striking a tuning fork near a spider it can be persuaded that it hears a fly and will seize the fork and bite it.

Bees and wasps often appear to mistake flowers on wall paper for the real thing.

Continued on Page 40

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Latrodectus Mactans, Male

THE BLACK WI D

THE black widow spider, *Latrodectus mactans* Fabr. has for a number of years received insufficient publicity in newspapers and magazines. Presumably the editor of *Pests* has felt that this neglect of so important a species has gone far enough. Hence his request for this effort to tell about the black widow.

The black widow spider is about a half inch long; its round shiny abdomen has a deep red hour glass figure on the ventral side. It may also have a round red spot at the rear end. Immature individuals may have several red spots on the back of the abdomen or a red band in the place of these. The male has the same hour glass figure, a red band on the back and some transverse white lines.

Throughout the United States and parts of Canada black widows may be seen, but only in the southern states are they fairly common and generally distributed. Even here they vary widely in numbers. For several years the species may occur so abundantly that a score of specimens can be gathered in an hour or so. Following the peak in population, a year or two later, specimens may be very difficult to find. Nor are these spiders distributed at all evenly. In some localities they may be abundant, in others apparently not to be found.

Such variation in numbers has not been explained. Black widows are beset by several parasites (attacking the eggs) and a number of predators including other spiders, scorpions and several wasps, notably the blue muddauber. However the natural enemies are probably not the reason for the periodic decline of black widows. Low temperatures disposes of many of the immature individuals in the south central states. Severe winters may be the major cause of variation.

Black widow spiders are commonly found in hollow stumps, frequently under stones, also in holes in the ground, even cattle tracks. Less often in dense foliage of shrubs or herbaceous plants. In houses they are commonly in the basement, under the house, or in other sheltered places. They are well known to occur in outdoor toilets where they usually hide under the seat. Wood piles, rock piles and rock walls offer a suitable habitat and sometimes accomodate a considerable number of these spiders.

Mature females may be observed during May, June and July. During these months most of the cocoons are produced, from three to six or eight per female. The number of eggs in the cocoon varies from none to over 700. Males, of course, occur at this season also, but, because of their small size (about ¼ the size of the female which is about ½ inch long), are not often observed.

The hiding place of a black widow is readily identified by the web surrounding it. The silken threads of the web of this species are so much stronger than those of any other spider in a similiar situation, that the maker is easily and reliably identified. The golden garden spider produces a fairly tough silk, but spin a so-called orb web in trees and bushes. The web of the black widow is a criss-cross network without any pattern.

The young spiders hatch in about eight days but remain in the cocoon for two or three weeks longer, till they have shed the skin. On emerging from the cocoon they climb the nearest weed-stalk, post or shrub, proceed to spin out a thread of silk, and the buoyancy of this presently carries them away with the wind. It has been suggested that by this means the black widow has become distributed, not only all over the U. S., but has become established on various islands such as the Hawaiian Islands. However wind and sail are not the only means of travel for *L. mactans*. Public Health Reports for December 15, 1939 report an "Unusual Infestation of a Ship with Black Widow Spiders." After fumigating the vessel with hydrocyanic acid gas, 175 adult black widow spiders and numerous cocoons were collected. Incidentally, this vessel had an adequate cockroach population providing an ample food supply for the spiders. Freighters and other cargo vessels may be responsible for the general distribution of black widow spiders on the islands of the Atlantic and Pacific Ocean.

The young spiders that survive the winter complete their development during the following spring, when mating takes place and another generation gets under way.

The black widow is not the fierce and aggressive creature that some people would have us believe. Neither is it a "ferocious enemy of mankind." Like almost all other spiders, it is very shy, retiring, and makes every effort to escape when discovered or cornered in its shelter. It does not run around seeking whom it may

DOW SPIDER

by DR. W. J. BAERG
Department of Entomology
University of Arkansas

devour. However, under certain circumstances, the female will bite a person. When the spider is in a shoe that is being put on, the spider may bite. When caught inside a shirt sleeve or in a similar situation it may bite. Most cases of spider bite occur in outdoor toilets. Here the spider is induced to bite because of the stream of water hitting its web.

Effects of the Poison

The symptoms described here were observed during the summer of 1922 when I induced a mature black widow to bite me on the inside of the third finger of the left hand. The first resulting pain, a sharp piercing sensation, is felt almost immediately after the bite has taken place. Gradually this pain spreads, in about 2 hours it extends over the arms and chest, and in 3 hours extends to almost all muscles of the body.

Along with severe muscular pain is a mild paralysis of the diaphragm so that speech and breathing are somewhat forced. There is a low and variable fever and pronounced nausea so that the victim may miss his meals for a couple of days. Neither does he get much sleep for a night or two.

After three days these symptoms have subsided and there are rarely any serious after effects, the victim may be somewhat listless for a few days. In rare cases there is a pronounced amnesia that may persist for several weeks. The case I had opportunity to observe was a young woman who was bitten on a toe while putting a shoe on. She reported that she had trouble in following a conversation, forgetting what the subject was. Writing a letter was difficult because she could not remember the spelling of many common words.

Hot water baths gave the only relief in my case. More recently calcium glucenate has been used successfully by a number of doctors. This appeared to be standard practice among the armed forces in the Southwest Pacific.

Extermination Measures

The cyanide treatment already mentioned apparently brought satisfactory results when followed by a second dose three weeks later. Most infestations cannot be destroyed by fumigation. Eliminating some of the hiding places by a thorough clean-up is worthwhile as is also spraying other shelters with refined coal tar creosote. This, if sprayed on the spiders, will kill them and will keep them out of favorite hiding places for awhile.

Incidentally, while a fairly dense population of black widow spiders may frighten some people, it is not necessarily a serious hazard. This was well shown on the infested ship referred to above. No cases of spider bite were reported. I have seen a farm yard that had at least 50 black widows hiding in various kinds of shelter. However, since the farm family was unware of the presence of this alleged "ferocious enemy of mankind," it was not a hazard.

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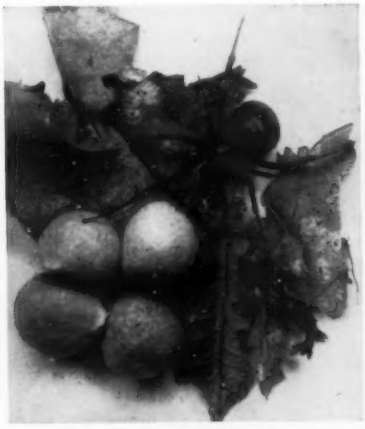
Black Widow, ventral aspect



Black Widow with cocoons

EDITORIALS...

The New PESTS

EVEN *PESTS* has taken on the "new look," but plans for the future of this publication go much futher than that and reveal more significant improvements than are first apparent in the new format inaugurated with this issue. Business, advertising and editorial offices have been moved to the 1900 Euclid Building, Cleveland 15, Ohio and from now on all of our activities will center from that address.

Under your new editor's guidance, *PESTS* plans to give you a broader coverage of the whole pest control field. You will find more extensive reports of latest control measures, on research by prominent entomologists, on government rulings, on opinions of leaders in our field, and on all other developments in the industry that might prove valuable. We plan to give you additional news and pictures of the accomplishments of local and regional PCO groups.

The *New PESTS* will work closely with the National PCO headquarters in New York and Bill Buettner has assured us of continuing cooperation from his office.

PESTS and Their Control will extend and broaden its field, and as we develop our new plans and work together, it will become more valuable as your news and reference magazine. We invite your suggestions and comments and look forward to hearing from our readers. Newsworthy items always are welcome.

Termite Racketeering

FROM Ohio comes the story of a woman who was victimized to the tune of almost $1800 in an attempt to free her home of termites, only to be told later that the premises needed further treatment. The particular exterminating company in question, which was recommended to Miss E. by a friend, checked her property and reported "infestation found." The exterminator reasoned he was unable to give an estimate since he could not determine the quantity of chemical required and the length of time it would take to complete the work. Nevertheless, the company was hired. Three men worked parts of two days for which the exterminator collected $1100.00.

A month later, a reinspection discovered the attic also needed treatment. A half-day was spent on this part of the house and $690 was charged. Two months later, another member of the same firm, but from a different field office, inspected Miss E's home and reported the attic "improperly treated." This was remedied, however, in another half-day's treatment for an additional charge of $600.

These cases are few and far between, but nevertheless, such racketeering is dangerous. It is not only unfair to property owners, but equally costly is the damage done to the reputations of all pest control operators. The only way to prevent eventual government interference in such matters, is for the industry itself to take active steps against unscrupulous operators in its midst.

Dangerous Precedent

WHEN governments supply services without cost to the public, it is liable to get a lot of people into bad habits. They may get the idea that certain free services should always be furnished by some local or federal government department and object to paying after they have once been supplied without charge. When William Buettner, NPCA secretary, comes out flatly and states that the pest control industry is strongly behind the Fish and Wildlife national rat campaign, but that the actual control work should be done by local pest control operators, he may have been thinking along these lines.

Every time some department of government undertakes to do a pest control job that can be handled by local operators, it jeopardizes the livlihood of all operators by setting a dangerous precedent. Because a rodent or insect control job may be classified as a public health project does not change the facts. All work done by every PCO is directly related to the public health. There is no reason why any government department should supply free service at the expense of those who make their livings in business.

Greater Prestige

THIS month's front cover of *PESTS* pictures screen-star Paul Muni and pest controller Charley Pomerantz at the conclusion recently of DuPont's "Cavalcade of America" featuring Muni in "The Alerting of Mr. Pomerantz" over NBC. As the story of a pest control operator who used his knowledge and experience to stem a threatened epedemic of an unknown disease, it gave widespread public recognition to the modern, scientific methods employed by PCO's to protect public health.

The more we look back on this excellently presented program, the more we realize the significance of the story it told. The pest control industry gained in prestige from this broadcast which gives men working in it a greater incentive to further their knowledge in this specialized field. Pest controllers can and do help prevent the spread of disease. But that's not all. As our research is continued, we become progressively better equipped to expand our services profitably.

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Cooperation Continued

A Guest Editorial by

William O. Buettner

Secretary, National Pest Control Association

WITH the change in ownership of *PESTS and their Control* and the establishment of a new editorial policy for this magazine, the new editor and publisher, James A. Nelson, has asked me to contribute a few words directed to the industry. Having conferred at length with the editor, I look forward to a continued close cooperation between the industry, the National Pest Control Association, and the publication. I have the new publisher's assurance that no effort will be spared to make the magazine more helpful and valuable to the industry, and to make and keep it a better magazine of and for the pest control operator.

As an afterthought on the broadcast, "The Alerting of Mr. Pomerantz," the industry is without doubt grateful to the Du Pont organization for the wide favorable publicity received. It did much to show the vital need for pest control and the knowledge of the expert operator in connection with safeguarding the public health. I am convinced that pest control operators through careful inspections and application procedures will observe and be a party to incidents that hold other hitherto unknown answers.

A few recent newspaper acticles and other publicity would make it appear that the recent emphasis on rodent control calls for "free baiting" campaigns. This is not at all intended to be done in the efforts that are being put forth by the National Committee on Rat Control with the U. S. Fish & Wildlife Service assuming technical leadership in urban areas (cities with population of more than 10,000). Similarly the larger program in the rural areas with the guidance of the U. S. Department of Agriculture through county agents, has as its objective the teaching of ways and means to reduce the rat population on farms.

Congress has made available an appropriation which is to be used in a program to conserve food which from the rodent angle involves millions of bushels of grain and other vital food commodities. Be sure to refer to NPCA Service Letter 499 which explains the modus operandi of the comparatively short "campaign" which it is hoped will at least make everyone more rat conscious and appreciate fully the importance of sanitation and applied common sense rat stoppage or rat proofing.

It is recognized that individual citizens and others might attempt to do some of their own baiting but every PCO should bear in mind that the actual rat extermination with poisons and fumigants in urban areas should be done by a PCO, not by any branch or department of city, state or federal government. Where any government department undertakes or plans to do the work themselves in any case, the protests of every PCO against government competing with private business are strictly in order. Rat control work should be done by those who know best how to do it—the experienced pest control operator.

A word regarding the overcautious attitude of buyers of pest control services may also be appropriate at this time. It seems that the tendency is for property owners, especially apartment house owners, and others to put off doing needed control jobs. Attempts to save money by cutting corners are more noticeable. Purchasing agents and other executives of industrial plants and food processing establishments appear to be more interested in "price" than to appreciate the need of exaluating time, labor and material required to do pest control work satisfactorily, based on a survey with its recommendations. The resistance to purchasing of PCO services has increased to a point where business is suffering. The only way to overcome this is to break down this sales resistance by more selling and harder selling, — an intelligent presentation of showing the importance of pest control maintenance service. All of us are working much harder to get business to day than we had to do a year ago. If we have to do it, we must, and will.

In closing, I want to offer best wishes and greetings to the new editor and publisher and also to let him know that the industry looks forward to a continuation of the mutually beneficial cooperation with the magazine.

INDEX

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Soil Poisons for Termite Control

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From U. S. Department of Agriculture Report

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Soil poisons are tested in a wooded area divided into 10 blocks at Agricultural Research Center, Beltsville, Md. Untreated wooden stakes are sunk into each plot of poisoned soil. Stakes are examined each fall for at least five years to fairly evaluate products tested.

SEVEN chemicals among those which proved reasonably efficient in the control of termites by soil-poisoning in a series of unfinished experiments at Beltsville, Md. are listed by the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. They are sodium arsenate, sodium fluosilicate, cryolite, phenothiazine, pentachlorophenol, and orthodichlorobenzine.

In preliminary announcement of results the scientists emphasize, however, that soil-poisoning is, in the main, a measure supplementary to primary termite control methods of a structural nature, which offer permanent protection.

Soil-poisoning, though beneficial, is less permanent and should be used only where structural control methods are impractical, or in addition to them. Most termite infestations are due to faulty construction and are found principally at filled porches, terraces, and other entrance structures, or in basement apartments. Control consists, in the main, in blocking off termite entry with concrete or other impervious material.

Other recommended measures for discouraging termite activity include adequate drainage around and under buildings, ample ventilation under them, and the removal of wood debris. Such measures apply to all construction but particularly to basementless dwellings which are exceptionally favorable to termite activity. Here soil poisons have their widest potential application. Numerous chemicals and chemical mixtures have been tried over the years, but most of these tests have been without adequate standards and controls.

In 1939 a conference of representatives of interested public and private agencies was held to draw specifications for standard test procedures for evaluating chemicals used in termite soil-poisoning work. Subsequently, experiments designed according to these standards were established at the Agricultural Research Center, Beltsville, Md., and under very much more severe conditions of termite infestation in the Panama Canal Zone. More recently these tests have been enlarged and others established at Saucier, Miss.

In these tests, holes are dug 15 inches in diameter and 19 inches deep, about 2 cubic feet of soil being removed. The soil is treated as it is replaced with the chemical to be tested. There are uniform blocks as replications and comparison is made with untreated controls. At least three rates of application are used, ½ pound of the poison material per cubic foot of earth being the standard. Wooden stakes are driven in the soil to find whether the material used protects them.

At Beltsville, 74 different treatments involving 27 chemicals and chemical mixtures have been tried, including some chemicals and dosages, that have already been recommended for termite control. A few had never been tried before. Some chemicals were tested merely as potential substitutes for others of which there were wartime shortages. Some that appeared promising in the laboratory were tried for effectiveness under service conditions.

Lead arsenate, used as a dry powder, proved remarkably good during 4 years of service, whether at ¼, ½, or 1 pound per cubic foot of treated soil and, after 3 years, dry sodium arsenate, as well as the 10-percent solution, held up remarkably well in low dosages. Sodium fluosilicate, cryolite, and phenothiazine used dry all show up well, but diphenylamine and phthalonitrile, which had appeared excellent in the labora-

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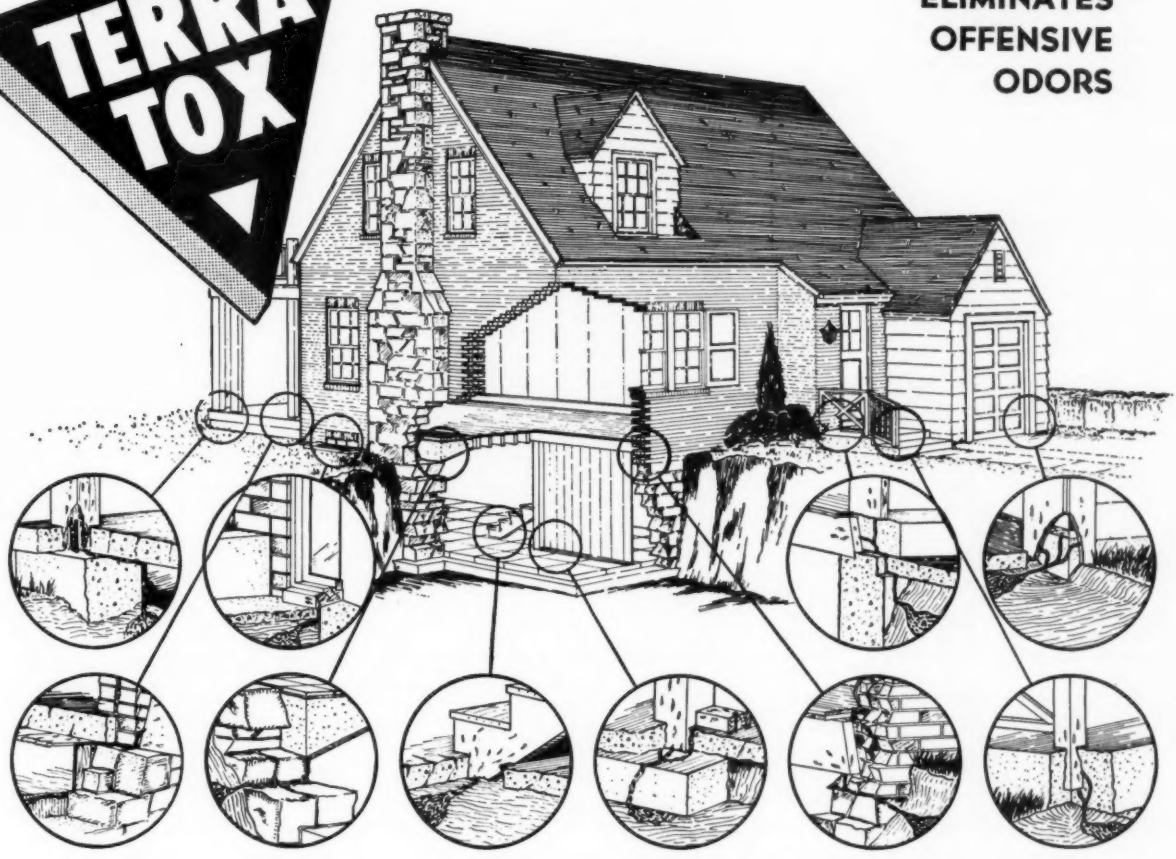

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tory, failed under these conditions. Trichlorobenzene, either alone or in combination with 5 percent of pentachlorophenol, proved good.

Pentachlorophenol when used alone was weak in low dosages and the highest dosage tested equivalent to 2½ gallons per 10 cubic feet, may be the minimum strength for effective protection. Orthodichlorobenzene proved erratic when applied in a dose equivalent to 1 gallon per 10 cubic feet. Both of these chemicals are now recommended in the Department of Agriculture Farmers' Bulletin No. 1911 (1946 revision) for use at somewhat higher dosages.

DDT apparently has value when used as a 5-percent solution in fuel oil. Further tests are necessary to obtain more complete information regarding the value of DDT as a soil poison against termites, since the use of oil alone proved satisfactory for 2 years.

Tests have not been so extensive under the more severe conditions in the Canal Zone where much higher dosages have to be used than at Beltsville. The experiment has run for a period of 3 years. All mixtures of creosote or of orthodichlorobenzine with Diesel oil, in dosages up to and including 7 gallons per 10 cubic feet, have failed completely. Pentachlorophenol in 5-percent solution in Diesel oil showed one failure, in a similar dosage; at this dosage orthodichlorobenzene used alone showed no failures. Sodium arsenite worked well in all dosages used, the lowest being equivalent to 6 gallons of 10-percent solution per 10 cubic feet.

Such dosages are extremely high and might prove excessively expensive in practice, but the severity of exposure there requires such drastic measures. Nearly all the check stakes used were destroyed completely as the result of termite attack. With the possible exception of the highest dosages of sodium arsenite, all treatments used in the Canal Zone will probably fail by the end of 5 years.

Comparing two stakes from treated plots (right) with two from untreated plots

Numerous tests have been conducted in the practical application of soil poisons for termite control in buildings, but they have usually been applied by common labor which was not closely supervised. Failures occurred with some poisons that had proved their value under carefully controlled experimental conditions. This emphasizes the fact that the treatment of the soil must be complete, regardless of the poison used, if termites are to be isolated from wooden structures.

Snyder's Termite Volume Revised

Thomas Elliott Snyder's authoriative work, "Our Enemy The Termite," has been revised and is now available. Dr. Synder is Senior Entomologist of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture.

Dr. Synder discusses the entomological and economic aspects of termites with a background of over 39 years experience in field and laboratory. Completely authoritative and rigorously scientific, this book is simply written so that anyone can understand it.

Important to PCO's, this revised edition keys the general or major groups of termites of the United States, based on both structural characteristics and habits. Many new illustrations are added to the text.

The first six chapters discuss the place of termites among insects, the different species, their life history and the caste system, their physiology and behavior, their food, and the guests that dwell in their colony.

The five remaining chapters discuss the damage that termites do; fundamental principles of control are described in detail to serve as a guide for standard procedure by the commercial operator. Practical suggestions are made for saving structures already infested. Various methods of control now available are discussed and fraudulent ones exposed.

With 261 pages and 84 illustrations, "Our Enemy The Termite," sells for $3.50.

OUR ENEMY THE TERMITE

By Dr. Thomas Elliott Snyder

261 Pages, 84 Illustrations, $3.50

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A. F. C. QUALITY PRODUCTS FOR PEST CONTROL

Chlordane, oil concentrate, liquid emulsifiable concentrate, wettable powder concentrate, and ready-to-use liquids and powders.

Super Fluorex V, powerful insecticide powder

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Pyrethrum and **DDT,** powders and liquids

FOR EFFECTIVE RAT CONTROL

Phosphorus Paste, Rumetan, Arsenic, Fortified **Red Squill** Extract and Powder, **Antu** and tracking powder, **Thallium Sulphate**

Prepared Rat Bait — ready to use, different flavors, Red Squill, Thallium, or Antu.

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Orthodichlorobenzene, Creosote Oil, Sodium Arsenite Powder, Pentachlorophenol Concentrate.

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"RAT-GLU"

Catches RATS and MICE Like Flies on Fly Paper

NEEDS NO *Poison* OR *Bait*

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RESIPROOFER is a superior mothproofer because it uses many of the same principles employed in the wool dyeing industry. Like many wool dyes, RESIPROOFER

- is applied from a water solution.
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- will not alter the feel or appearance of treated garments *even if* overdosed.
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What a Salesman Should Know About INSECTICIDES*

By Dr. J. J. DAVIS

Dept. of Entomology, Purdue University

COMMENTS coming to me from institutions and others emphasize the fact that too often salesmen from sanitary supply houses are high-pressure salesmen with little practical knowledge of the supplies which they sell. Similarly, there is criticism of some sanitary supply houses who are putting out questionable materials for which unwarranted claims are made. This seems to be particularly true of items under the heading of insecticides and disinfectants. In other words our observations would indicate a lack of knowledge on the part of the salesman of the practical use and application of chemicals used in maintenance service and too many extravagant claims of values.

The information I have received assures me that supply companies might well put men in the field who are not only salesmen but those who have a knowledge of the problems involved. They should see the prospective buyer's general need and anticipate the proper items to sell before this general need matures into a serious condition. Perhaps such an attitude would cut down the immediate sales, but certainly would increase the good will and improve sales in the end as well as build up confidence in the mind of the purchasing agent.

ALL ARE interested in sales and financial returns. Every seller is, or at least should be, interested in permanent sales, rather than temporary sales. This being the case those who include insecticides in their list of items, should understand the insect problems especially how insecticides affect insects and how they can be best applied. Not only should salesmen understand their insecticides and how they can best be applied, but should have an understanding of insect life and insect habits, which will materially help in aiding customer assurance and confidence in the salesman.

Perhaps I should say a word regarding the significance and future of the insecticide business, and in this connection I need to emphasize the insect problems which confront us. Few people really realize the great importance of insects to our economy and in our lives. It is authoritatively estimated that insects cause losses totalling two billions of dollars in the United States each year. We generally think of insects as pests of growing plants and to be sure every plant has its insect enemies and many plants are hosts to a large number of different kinds of insects. For example, the corn plant has perhaps 250 different kinds of insects which feed upon it and they may attack every part of the plant. Wireworms and seed maggots attack the seed in the ground; later as the plants grow we have white grubs cutting off the roots, root worms tunnelling the roots and root aphids sucking the plant juices; as the plant grows above ground we find cut-worms cutting off the stalks, armyworms defoliating the plants, chinch bugs sucking the plant juices and stalk borers and the corn borer tunnelling the stalks; after storage the grain weevils attack the grain, and even after the corn has been made into a finished product such as corn meal, the meal worms and other insects are there ready to feed and damage the product.

Many insects attack stored products and the losses run into many millions. We have still others which are animal parasites. Many are annoying, some destroy home furnishings, and still others are responsible for huge losses to buildings.

Not the least of insect destructiveness is their remarkable ability to carry disease. Pierce in his book on medical entomology, published in 1921 devoted 27 pages to the mere listing, in fine print, of the maladies of man and domestic animals that are spread by insects and other arthropods. Since that date we know of many others. Just to emphasize their importance I might mention a few, such as bubonic plague, responsible for millions of lives during the middle ages, which is carried by fleas; typhus fever carried by body lice; Rocky Mountain spotted fever by ticks; sleeping sickness of Africa by tsetse flies; equine encephalomyloites by mosquitoes; disentery, typhus fever, and others by house flies; and malaria, yellow fever and dengue by mosquitoes.

Future of Insect Control

THIS brief listing of the destructiveness of insects will convince everybody of the great field ahead of us in insect control. Also that there is an enormous field for effective and practical insecticides in the protection of our crops, animals, our material belongings and human lives, and at the same time support service operators and an enormous insecticide industry which will be reflected in the growth of the sanitary supply industry.

It should be noted that not all insects are harmful. Many are very beneficial, as follows: Natural enemies of harmful species. Many insects are parasites or predators on other insects, in fact they are largely responsible for maintaining a balance in nature. About half of our most destructive species are of foreign origin and a major reason is because they are introduced without their nor-

* Based in part on address by Prof. Davis before National Sanitary Supply Ass'n., Detroit, Sept., 1947

To make your Insecticides most effective...

use the SOLVENT that gives best results

Penn-Drake

INSECTI-SOL

Its complete freedom from stain and odor makes PENN-DRAKE INSECTI-SOL the ideal base for use in the manufacture of all types of insecticides. Special qualities make INSECTI-SOL the perfect solvent for use with DDT solutions or DDT crystals in low concentrations. A valuable characteristic of this 100% volatile product is its ability to float longer, giving your insecticide maximum penetration and greater kill.

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When a high quality, odorless solvent is required, think of PENN-DRAKE SUPER-SOL. This super-refined solvent is especially efficient as a base for mothicides. It is also recommended for odorless paints, home dry cleaners, metal parts cleaners, DDT residual sprays and other applications where a high flash is desirable. SUPER-SOL is ideal when fast drying or rapid evaporation qualities are needed.

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Its ODOR Terrifies!
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Its EATING "Kills"!

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IMMUNIZE Bagging, Boxes, Cartons, Bins and other Vulnerable Containers against Rodents.

MIX SCARAT in Soya-Bean and Vegetable Plastics to protect them from hungry Marauders.

PAINT it on Wood and Wall Board to keep Vermin from Buildings.

Harmless to Human Beings, Pets and Domestic Animals.

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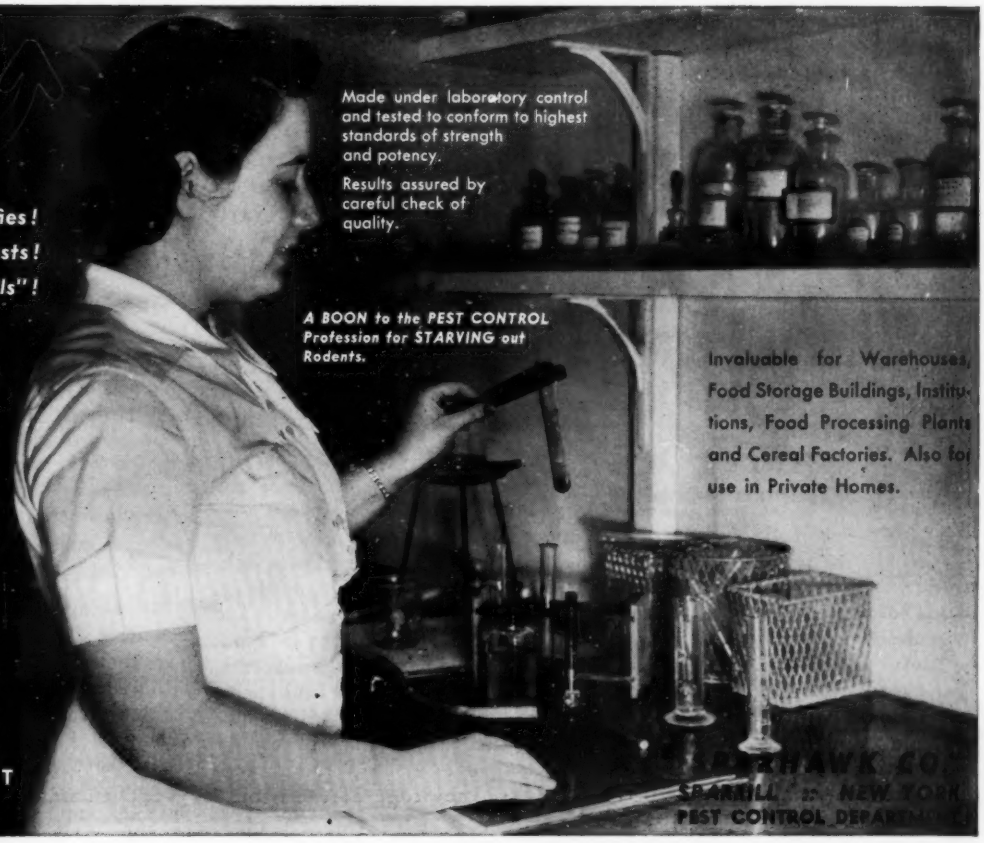

Made under laboratory control and tested to conform to highest standards of strength and potency.

Results assured by careful check of quality.

A BOON to the PEST CONTROL Profession for STARVING out Rodents.

Invaluable for Warehouses, Food Storage Buildings, Institutions, Food Processing Plants and Cereal Factories. Also for use in Private Homes.

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mal natural checks. Outbreaks of many insects are due largely to the fact that something has killed off their natural enemies, thus permitting the host insects to develop and increase unrestricted. Thus, if it were not for the natural enemies, insects would undoubtedly overrun the earth.

Crops, such as fruits and many vegetables and field crops, require insects to pollenate them. All insects which frequent flowers are potential pollenizers but honeybees and bumble bees are most important. It would be impossible to produce these crops were it not for such insects. Many insects produce products of commercial value. Examples include the honeybees which produce honey and beeswax, silkworms produce silk, the lac scale insect produces a product used in the manufacture of fine lacquers and varnishes and an aphid produces galls which gives us our best tannic acid.

Insects are of value in disposing of dead plant and animal material thus eliminating it as a hazard and returning it to usefulness in the soil. It has been thoroughly demonstrated that plants of little economic importance in one country may become scourges when introduced into another country where its insect natural enemies are not present. In other words insects are undoubtedly beneficial in keeping under control many different weeds. A few insects have proven of value in surgery and medicine. Thus, flesh maggots are aids in the healing of flesh wounds, malaria mosquitoes for syphilis control, and bee venom for arthritis, rheumatism and similar ailments. Thus we see that some insects are beneficial and valuable to man in a variety of ways.

Principles of Insect Control

MANY chemical laboratories of the larger industrials are producing hundreds and even thousands of new chemicals, mostly organics, which they believe may be useful as insecticides. In general, little is known as yet of their insecticidal values, their toxicity to plants and animals, and their formulations. And yet, many of these chemicals may hold vast possibilities and are deserving of intensive study. Certainly the future holds much in store, but as already stated, these future developments complicate the problems rather than simplify them and therefore those who handle insecticides, whether service operators, salesmen or manufacturers, must have a more complete knowledge of insects and insect life and the relation of this knowledge to control procedures.

The American people have gotten away from most of the patent medicines which filled the shelves of drug stores in years past and are increasingly dependent on the trained physician. And so it is coming to be, that these same people are depending on commercial service or dependable information for pest control, just as they depend on the carpenter for a satisfactory job of construction or building repair. We must remember that at least 70 percent of pest control is correct application of whatever materials is used.

Now a word regarding the fundamental principles of insect control. I think of them as three: 1. Diagnosis or Recognition of the Insect; 2. Prescription or Remedy; and 3. the Application.

1. Diagnosis. Just as the physician must know the cause of an ailment, so must the maintenance service man know the cause of an insect trouble which he may encounter. Recognition of the insect involved, either by recognition of the insect from specimen or damage, is of first importance. This requires a knowledge of insect classification or identification and an understanding of the characters of insects and their damage.

2. Remedy. Again, as in the case of the physician, once the trouble has been diagnosed, one must be able to provide a remedy or prescription. Since insect controls are based on our knowledge of the life history, habits and structure of the species in question, one must have such information or know where to find it, before he can adequately determine what to use and how to use it. This involves also an understanding and knowledge of chemicals.

3. Application. Perhaps of greatest importance is application of the remedy, for as I stated a while ago, at least 70% of the control is correctness of application. One may correctly identify the problem and he may be able to decide on the best treatment but after all the final results are determined by the correctness, thoroughness and timeliness of the application, as well as an understanding of equipment for making the application. The sanitary supply salesman is morally obligated to understand and demonstrate the products he sells. Otherwise, he should refer the customer to a reliable commercial pest control operator.

Now, about new insecticides, may I preface this with a brief history of insect control. Insect problems are as old as history. We read in the Old Testament of swarms of flies and pestilence, of locusts, of canker worms, and other insects. Insects were supposed to develop spontaneously, as might be expected when maggots were observed developing without apparent cause in decaying flesh. Only a few hundred years ago insect control was a church problem and we read of church trials against insects. One hundred to 200 years ago we find all kinds of decoctions recommended for insect control. These usually consisted of all kinds of ingredients which were obnoxious to man, the theory being that whatever was obnoxious to man was obnoxious to insects, which we now know is untrue. The real beginning of the science of economic entomology or insect control was only about 70 years ago with the advent of paris green. However, during the past five or six years there has been a greater progress in chemical warfare against insects than during all previous years.

Newer Insecticides

OF THE many new chemicals being developed for insect control all are more or less specific in their action, which emphasizes the necessity of a complete knowledge of each chemical for proper usage. For example, DDT has little effect on the Mexican bean

Continued on Page 40

"TOX-EOL"
for TERMITE CONTROL

Backed by 15 Years Effective Use

FOR WOOD AND SOIL TREATMENT

PRACTICALLY STAINLESS!

NO LASTING ODORS!

Available in a 12½ to 1 Concentrate

Advertising and dealer cooperation furnished contract agents including a 5-year warranty. We only have a few open territories but yours might be open. Write today for details.

CRE-O-TOX CHEMICAL COMPANY

Pioneers in the use of chlorinated phenols for termite control.

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Spread and Power

Effective pest control requires wide spread of insecticide and the driving power to force it into every crack and crevice—under mouldings, behind baseboards, around plumbing, between cases and bales.

MISTMASTER Ball Bearing Fan Type Sprayers have both the spread and the power to do a quick, thorough job. Driven by 1/3, 3/5, or 1 hp. motors, they spray insecticides for distances as far as 40 feet, penetrate into hard-to-reach places, and spray large areas quickly, completely.

Here is a sprayer that has more power than any other portable sprayer, yet is convenient and easy to handle. Equipped with 1-gallon non-corrosive tank, driven under low pressure with a high volume of air, it can be used with any type of insecticide, either oil base or water base, and carries insecticides into remote openings in full volume and power.

Used anywhere, it plugs into any electric outlet, and is supplied with three nozzles for fine, medium, or coarse spray, can also be furnished with 2-gallon tank and special nozzles or in special design to meet individual requirements.

WRITE TODAY for further details and complete specifications, or mail the coupon.

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It Pays TO USE ELKAY

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  Vaporizers — Crystals — Cakes
- **DDT. & Chlordane Concentrates**
  Specially compounded for household and agricultural insecticides.
- **Refined NAPHTHALENE**
  Flakes and Balls — Packages and Barrels
- **SHUR-KATCH Mice and Rat Pads**
  Catches Rodents Like Flypaper Catches Flies
  NO POISON — NO BAIT

WRITE FOR DETAILS AND PRICES NOW!

ELKAY PRODUCTS CO.
323-27 West 16th St. New York 11, N. Y.

National Sanitary Supply Ass'n. Meets In Chicago, April 18-21

25th Anniversary to Highlight Convention in Morrison Hotel

The National Sanitary Supply Association will celebrate its 25th anniversary when it meets in the Terrace Gardens at the Morrison Hotel in Chicago on April 18 through the 21st. A principle feature of the four-day convention will be the one hundred and ten

Jules R. Lovinger, NSSA President

exhibits of manufacturers' merchandise to be displayed on two floors in the exhibition hall, which will be open every day.

Ace sales trainer, Jack Lacy, of Lacy Sales institute, will present the high lights on his nationally-celebrated sales clinic. Lacy has given his successful course to many large corporations in this country. His talk will reveal new techniques for making sales effort more effective.

Business meetings promise to be jam-packed with useful and effective ideas for future prosperity in the sanitation business. Election of officers will also be held and the NSSA constitution and by-laws will be amended.

Registration fee is $15.00. For an additional $7.50, ladies will be admitted to all convention and exhibition affairs, including the banquet, plus a special supervised tour of the city, visit to various radio shows, etc.

The NSSA convention will open on Sunday, April 18th at 9 A.M. when the exhibition hall will be open all day until 8 P.M. First meeting will be called to order by President Jules R. Lovinger at 2 P.M. in the Terrace Gardens of the Morrison Hotel on Monday. Sessions will close with a gala

Leo J. Kelly, NSSA Executive V. P.

floor show and banquet beginning at 7 P.M. on Wednesday, April 21st.

URGES IMMEDIATE REGISTRATION OF ECONOMIC POISONS

The Department of Agriculture urges manufacturers of insecticides fungicides, and disinfectants to register their products with the Department as speedily as possible. Registration is required under the Federal Insecticide, Fungicide, and Rodenticide Act for all economic poisons that are shipped in interstate commerce.

This law, already in effect for rodenticides and weed killers, becomes effective for insecticides, fungicides, and disinfectants on June 25, 1948. Registration is required by that date.

Officials of the Livestock Branch of the Production and Marketing Administration who administer the Act point out that labels now in use for economic poisons, and which comply with the Insecticide Act of 1910, may have to be changed to comply with the new law. Because of the time required to make changes, all labeling subject to the Act which has not already been registered should be submitted promptly for registration.

The cooperation of all manufacturers in the early registration of the poisons will aid materially in speeding up operations under the law as soon as it becomes effective without hardship to the distributors and without interfering with the flow of such poisons to farmers and other users. This is especially necessary now that food production and conservation is so important to the public welfare.

Manufacturers who are uncertain as to the revisions which should be made in their labels should not hesitate to submit the labels they purpose and which they believe comply with the law. The proposed labels may be submitted in rough draft form, including sizes of type, layout, colors and other features, together with full information concerning the product. The Department will indicate to the manufacturer whether the proposed labels are acceptable or inform the manufacturer of changes that should be made. Early submission of labels and formulae for reisgtration is essential to make certain of compliance with the law and to allow time for final acceptance by the Department by the June 25th deadline.

The Department suggests that manufacturers of economic poisons which should be registered obtain copies of the Act, the regulations, and the application form for registration immediately from the Insecticide Division, Livestock Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

PUT 'EM ON THE *Spot*

use NEOCID DDT COMPOSITIONS

Roaches, bedbugs, fleas, mosquitoes haven't a chance when you—

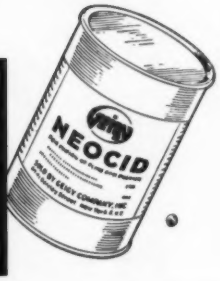
***Dust with* NEOCID A-10** — a ready-to-use DDT powder

***Spray with* NEOCID D-30** — after dilution with deodorized kerosene

These highly effective formulations were developed by Geigy Company, *"Originators of DDT Insecticides."* They are backed by 9 years of experience in DDT compounding and application.

If your local dealer doesn't have these NEOCID* DDT Compositions, just send us his name and address.

*Reg. U.S. Pat. Off.



ORIGINATORS OF **DDT** INSECTICIDES

Geigy **GEIGY COMPANY, INC.**

89 Barclay St., New York 8, N. Y.

M·S·A: PROTECTION HEADQUARTERS *for the* PEST CONTROL OPERATOR!

M.S.A. supplies the safety equipment you need for dependable protection in pest control on the job . . . developed by intensive research and quality—built by the world's largest manufacturer of approved safety products. You're sure of safe performance and top wearing comfort when you specify M.S.A.—all the way!

M·S·A CHEMOX* OXYGEN BREATHING APPARATUS
Self-generates oxygen as you breathe, using replaceable canister! Respiratory safety in *any* gaseous or oxygen-deficient atmosphere.

M·S·A DDT RESPIRATOR
Replaceable twin chemical cartridges prevent inhalation of DDT and DDT solvents or carriers. Easy-fitting facepiece.

M·S·A HCN GAS MASK
Protects against HCN concentrations wherever enough air is present to support life. Long-lasting, replaceable canisters.

M·S·A DUST RESPIRATOR
Popular M.S.A. Comfo and Dustfoe models provide ALL-DUST breathing protection, with inexpensive throwaway filters.

M·S·A GAS TIGHT GOGGLES
Keep gases, mists and irritating dusts out of eyes. Non-fogging water chamber design.

M·S·A FEND HAND CREAMS
When rubbed on the skin, provide protective barrier against irritants. Easily washed off after work.

M·S·A FIRST AID KITS
Unit-packaged first aid treatments, ready for instant use. Dust and moisture-proof steel cases.

Write for descriptive Bulletins on these outstanding M·S·A Products!

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MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STREETS
PITTSBURGH 8, PENNSYLVANIA
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KILL SALES-RETARDING ODORS

with pleasant, effective

MM&R DEODORANTS AND PERFUMING MATERIALS

Scientifically perfected by specialists in the art of making pest-killers easier to sell — by making them pleasanter to smell.

If your problem is perfuming or deodorizing (with cost a prime factor), MM&R CAN BE OF SERVICE TO YOU. Send us a small sample of your un-deodorized or un-perfumed product. Our laboratories will work out an effective neutralizer that fits your budget.

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SINCE 1895 . . . ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS
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Los Angeles: Braun Corp. • Seattle, Portland, Spokane: Van Waters & Rogers, Inc.
San Francisco: Braun-Knecht-Heimann Co.

PCO NEWS...

Purdue Appoints Osmun

John V. Osmun has been appointed Assistant Professor of Entomology at Purdue University effective March 1 and will be actively connected with the new four-year course of study in structural pest control. Osmund comes to Purdue from Merck & Co., Inc. where he was a member of the research entomological staff. Much of his pest control background was gained in four years in the Army. During three of these years he served as entomologist in charge of pest control in the First Army Command. Osmund is a graduate of the University of Massachusetts and has a Masters degree from Amherst College.

Neb. Club Hears Usher

M. H. Usher, of the City Sanitary Exterminating Co., Lincoln, Nebraska, spoke before an evening meeting of the newly-organized Entomology Club of the University of Nebraska on March 2nd. His subject was the "History of the Pest Control Business and Modern Methods of Control."

The large membership and good attendance at this meeting was evidence of the interest of young men in the opportunities offered in the pest control field.

Innis, Speiden Re-elects

W. H. Sheffield was re-elected president at the annual meeting of stock holders of Innis, Speiden & Co., New York on February 11th. Also re-elected were C. C. Wickstead, vice-president and treasurer, and G. S. Hamilton, vice-president and comptroller.

New officers elected at the meeting were W. H. Sheffield, Jr., vice-president; E. T. Ladd, vice-president; and R. C. Palmer, secretary.

John E. Vanderwater

New M M & R Sales Rep.

Most recent addition to the sales force of Magnus, Mabee & Reynard, Inc. is John I. Vandewater who will work in the New York city area.

A graduate of Syracuse, University, Vanderwater was a sergeant in the Combat Engineers and earned four battle stars for duty in the European and South Pacific theatres.

Before joining MM&R, Vandewater was a sales representative for the Dow Chemical Company.

Donohoe Heads Division

Dr. Heber C. Donohoe has been appointed Director of the new Technical Division of William Peterman, Inc., Newark, N. J. The division has been formed for the development, manufacture and supply of insecticides to industrial, institutional, housing developments and other large scale users of such materials.

Company research director since 1943, Donohone is the author of nearly 100 technical and popular papers on insects and their control, majoring principally in pests infecting stored foods and attacking or annoying man and animals.

New Moth Compound

Residex Corporation, Newark, N. J. is offering a new compound, "Resiproofer," said to protect fabrics from moth and carpet beetle damage and to withstand repeated washings and dry cleanings.

Chemically, manufacturers say, Resiproofer is the acid salt of an aromatic amine. It is a colorless, non-inflammable material which is said to leave no odor on fabrics, to be unaffected by light or salt water.

It is claimed that ready-to-use solutions of Resiproofer pentrate individual fibres without leaving abrasive crystals on the surface thus eliminating any harsh feel to treated fabrics.

In its concentrated form, Resiproofer is soluble in water, yet after it has been applied to fabric, water will not dissolve it nor can it be removed by dry cleaning solvents, it is said. The reason given by Residex for this water and solvent fastness is that Resiproofer combines chemically with the molecules of the fibre to become an integral part of it. The reaction product apparently is not attacked either by moth or carpet beetle larvae. Resiproofer may be applied to fabrics by spraying at room temperature.

Becomes Board Member

Leonard T. Beale, president of the Pennsylvania Salt Manufacturing Company, has announced that his board of directors has elected Y. F. Hardcastle to become a board member. Hardcastle, who has been vice-president in charge of manufacturing since 1927, joined Pennsalt in its engineering department in 1909.

KILL-ALL CHANGES NAME

Kill-All Pest Control Co., Inc. has changed its name to Complete Pest Control Co., Inc., 1844 N. 3rd St., Milwaukee, Wisconsin.

HERE'S how to check *RAT ODORS*

IT'S AMAZING!

get "CHEK"

SPRAY OR POUR

SPECIAL . . .

Ask About the
New PER-MO Antu
Rat Bits in Assorted Flavors

Here's a real rat-odor killer. "CHEK" . . . the newest name in deodorants for putrefactive odors is "CHEK" . . . powerful enough to check odors of decayed animal and vegetable matter. "CHEK" can be used

- For mopping floors (particularly wooden or porous floors).
- Cold storage rooms. Garbage cans.
- Locker room floors.
- Shower stalls.

Available in Quarts or Gallons . . . order today . . . send $1.00 for generous sample.

PER-MO ALSO MAKES PER-MO MOTHPROOF LIQUID . . Fast repeater! Odorless! Packed in Bulk or to your request . . . PER-MO FLAME PROOF LIQUID . . . Approved by Kansas City, Missouri, Fire Marshall. Does not harm fabrics, decorations, etc., that water will not harm. Spray or dip! PER-MO "ANTU" RAT PASTE . . . Prepared ready for use . . . PER-MO "RED SQUILL" RAT PASTE . . . Prepared ready for use. PER-MO RAT BITS . . . Sure death to rats — non-poisonous to humans, pets, domestic animals. PER-MO RAT and MICE LIQUID . . . Two-way sure death to rats and mice.

PER-MO
STANDS THE TEST
IT'S BY FAR THE BEST

* Putrefactive Odors

Write Today . . . Full Particulars First Letter

PER-MO PRODUCTS COMPANY
3602-04-B Woodland Kansas City 3, Mo.

THE NEW WILLIAM PETERMAN PROFESSIONAL INSECTICIDE LINE

PETERMAN PRO-KILL POWDER*
PETERMAN PRO-CHLOR LIQUID
PETERMAN PRO-TOXIDE OIL BASE CONCENTRATE*
PETERMAN PRO-TOXIDE EMULSIFIABLE CONCENTRATE*

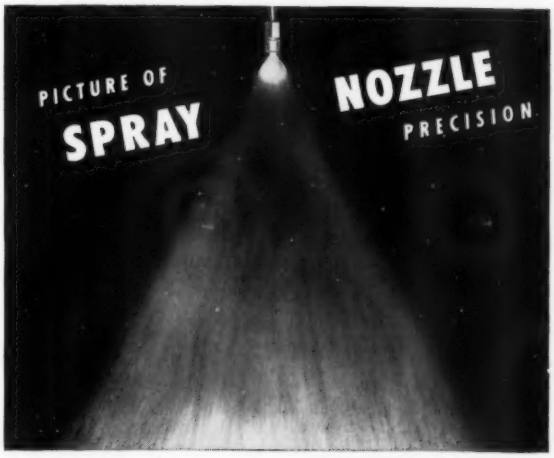
WHAT DO THESE MEAN FOR YOU?

LARGER PROFITS
INCREASED BUSINESS
FEWER SERVICE CALLS
MORE SATISFIED CLIENTS

DESCRIPTIVE BOOKLETS AVAILABLE ON REQUEST

WILLIAM PETERMAN, INC.
NEWARK 5, N. J.

* BASED ON THE PYRENONES



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WRITE FOR CATALOG 22

Taken at Sixth Annual Canadian CPO Conference, University of Montreal, February 15-18, 1948

Directors Appointed at Convention of Canadian PCA in Montreal

The following members were appointed Directors for the term 1948-49 at the annual business session held at the Berkeley Hotel, Montreal, during the Sixth Annual Canadian Pest Control Operators Association convention, February 16, 17, and 18, 1948:

President: Charles Riess.

Regional Vice-Presidents: Western, J. W. Alderson; Central, C. M. McCarthy; Eastern, W. O. Maheu.

Secretary-Treasurer: Jack Rudick.

Directors: D. W. Sanderson, Eugene Bellemare, J. L. McNulty.

Past Presidents: W. S. Bomby, C. E. Ryder, A. Friedman.

The following committee chairmen were also appointed: Governmental Legislations, W. S. Bomby; Constitution & By Laws, C. M. McCarthy; Public Relations & Advertising, W. O. Maheu; Grievance, C. E. Ryder; Conference Committee, Prof. E. R. Bellemare; Rodent Control, A. Friedman; Technical Committee, Dr. C. R. Twinn.

Active and Allied membership dues for the Canadian Pest Control Operators Association have been advanced to $30 per year because of the increased cost of broadening its services to members. U. S. memberships remain unchanged at $10 per annum.

La. PCOs Reorganize

The Louisiana Pest Control Operator's Association was reactivated during the conference of the Southern Pest Control Operators at Louisiana State University during the latter part of January. Joseph Mandlebaum is president of this re-formed group, J. H. McBride, vice-president, and R. E. Couhig, secretary-treasurer. Non-members interested in joining should write to the Louisiana PCO, 223 North Carrollton Avenue, New Orleans 19, La.

Miss. PCOs Unite

Twenty-five men attended a meeting held in the Edwards Hotel, Jackson, February 28th by Mississippi pest control operators in an effort to organize a state PCA.

Speeches on the value of a statewide PCO organization were made by Dr. Clay Lyle, State Entomologist, State College, Miss.; L. S. (Buggs) Bridges, Baton Rouge, La.; Walter A. Helms, Jacksonville, Fla., Regional Vice-president, NPCA; and Louis Koteler, Memphis, Tenn.

J. C. Redd was elected temporary chairman with Charles Treadway as temporary secretary. Redd appointed T. A. Mullen, Charles Treadway, C. C. Woodward, and Grady Sartor as a committee to draw up by-laws.

The following men pledged themselves to become charter members of the Mississippi Pest Control Service;

J. C. Redd, Redd Pest Control Co., Jackson.

T. A. Mullen, Bruce Terminix Co., 504 Orlando Street, Greenville.

J. B. Hendrick, Magnolia State Antimite Co., Yazoo City.

Grady Sartor, Getz Exterminators, Biloxi.

C. C. Woodward, State Termite Control, Jackson.

L. W. Havard, Havard Pest Control, Hattiesburg.

A. H. Jackson, Superior Termite and Rat Control, Jackson.

C. C. Snipes, Route 5, Meridian.

C. B. Treadway, Orkin Exterminating Company, Jackson.

Gayle L. Snipes, Snipes Pest Control, 1489 Merton Street, Memphis, Tennessee.

Tulsa PCOs Elect 3

New officers for the Tulsa Division, Oklahoma Pest Control Association, Tulsa, Olkahoma for 1948 are:

Mathews Nelson, President
H. G. Kopp, Vice-President
J. Earl Griffin, Sec'y-Treas.

ADDITION:

In our February report of the first Nebraska State PCA meeting the name of Mrs. Ethel Levenson of Omaha, as one of those attending, was omitted.

CALENDAR OF MEETINGS

National Restaurant Association Annual Convention and Exposition — April 14-17, 1948 Public Auditorium, Cleveland, Ohio.

National Sanitary Supply Association Annual Convention and Exposition, April 18-21, 1948 Morrison Hotel, Chicago, Illinois.

Florida Pest Control Association Fourth Annual Meeting, April 22, 23, 1948 University of Florida, Gainesville, Florida.

NAIDM Mid-Year Meeting — June 14-16, 1948, Hotel Monmouth, Spring Lake, N. J.

NJPCA Talk Flies

Dr. Elton J. Hansens of Rutgers University was to have been the principle speaker at the meeting of the New Jersey PCA held March 30th in the Hotel House, Newark. Dr. Hansens' talk was entitled "The Commonly Encountered Flies and Their Control," covering new methods for effective fly control.

Largest Mich. Course

Progress of the Michigan PCOA and the NPCA in dignifying the pest control profession and bettering public service was outlined at at a banquet held March 8th at the Porter Hotel, Lansing, as part of the fourth annual two-day short course held at Michigan State College. Speakers were C. G. Oakman, Detroit councilman, and G. H. Hoekenyos, NPCA President.

Oakman said that in Detroit exterminators' classes and public education is under way to provide residents with rodent and vermin protection. President Hoekenyos advised rigid standards for members of PC groups because the public, he said, not only wants better pest control, but also to know which operators can be relied upon.

Equipment, materials, insects and rodent control were covered.

Missouri PCA Hears Hunt, Haseman, Jones Discuss Rat and Fly Control

RAT AND FLY control were the topics of discussion at the first 1948 quarterly meeting of the Missouri Pest Control Association held in the Daniel Boone Hotel, Columbia, Saturday, February 21st.

Following the business meeting by President Thomas C. Raley, Joseph W. Hunt, U. S. Public Health Service, Kansas City, Mo., talked on Rat Control. It was Hunt's opinion that too many PCO's are not doing a thorough job of cleaning up rat infestations and warned against taking rat jobs at a flat monthly charge. He suggested charging a "clean out" fee plus a monthly charge to assure the customer of thorough rat stoppage and the PCO of sufficient pay for a conscientious job well done. Lloyd R. Gates, Senior Public Health Engineer, Kansas City, discussed the effectiveness of rat control in Kansas City and stated that 39% of the stoppage work was done by PCO's, 61% by building owners, and none by the city. Albert Happy of the Missouri State Health Dept. also gave a talk on rat work.

PCO Reynold Shuler, Termite Exterminating Co., Kansas City, moved the Association to favor the following resolution:

"That this Association go on record as favoring a charge for elimination, separate from a monthly service charge on rat control jobs, diligent effort being made to eliminate all rats at the earliest possible date." The motion was adopted.

Fly Control discussions were led by Dr. Leonard Haseman and field worker, George Jones. The automobile has contributed considerably to the reduction in fly population, it was pointed out.

Approximately 40 members attended this all-day meeting, and it was decided that the topic for the next meeting would be on Carpet Beetles, Moths, and Termites.

Members present at this February 21st meeting were:

Ralph Harnes, Getz Exterminators, Inc., Kansas City
A. J. Danella, Acme Exterminators, Kansas City
George A. Dyche, American Exterminating Co., Kansas City
W. F. Exner, Termiate Control Co., Webster Groves
H. J. Hall, Advanced Exterminator Co., Springfield
R. L. Hawks, Interstate Exterminator Co., Kansas City
John Karleskint, American Exterminating Co., Webster Groves
A. L. Linck, Paramount Fumigating Co., Kansas City
Chas. Maly, Maly Bros. Termiate Control Co. St. Louis
James O. Millspaugh, Millspaugh Chemical Co., St. Louis
Arthur Ochs, Antimite Termite Proofing Co., St. Louis
Roy Mason, Ragen Exterminators, Kansas City
Thomas C. Raley, Getz Exterminators, Inc., St. Louis
John R. Russell, Mexico Chemical Products Co., Mexico
Miss Lea A. Sain, A B C Exterminator Co., St. Louis
Jac Shafer, Jac Shafer Pest Control Service, St. Louis
Reynold Shuyler, Termite Exterminating Co., Kansas City
O. M. Weigle, Kingdom Chemical Co., Fulton
W. H. Hoffman, Advanced Exterminator Co., Springfield
Dr. Leonard Haseman, University of Mo. Dept. Entomology, Columbia
O. J. Lawson, Faultless Exterminating Co., Kansas City
Steve Spiegelhalter, Spiegelhalter Exterminating Service, Kansas City
Fred Rowland, Interstate Exterminator Co., Kansas City

The following were visitors present:

Dr. Lloyd R. Gates, City Health Dept., Kansas City
Mr. J. W. Dixon, Sanitary Div., Kansas City
Mr. Patrick Holloran, City Health Dept., Kansas City
Mr. Stockton, City Health Dept., Kansas City
Mr. Jos. W. Hunt, U. S. Public Health Service, Kansas City
Mr. Albert W. Happy, Jr., Division of Health, State of Mo., Jefferson City
Mr. Galen Oderkirk, U. S. Fish & Wildlife
Mr. Milton Caroline, U. S. Fish & Wildlife
Mr. George Jones, Missouri University
Mr. Andrew L. Crow, American Cyanimid Co.
Mr. Wm. J. Hawks, Interstate Exterminator Co., Kansas City
Mr. Lloyd E. Adams, Entomologist, Mo. Dept. of Agriculture

D. C. PCOs Protest Law

Proposed Poison Law for Virginia which came up before that state's legislature in February was protested by the Washington, D. C. Pest Control Association. This law, as proposed, would have made it a misdemeanor to place rat poison on any property where it would be readily accessible to domestic animals.

The bill was killed in committee.

ORGANIZATION NEWS...

California Plans for '49

Harmony of purpose was the keynote at the February convention held by the California Pest Control Operators' Association in San Diego. At that successful meeting, the constitution and bylaws of the CPCOA were revised to fit the growing industry better.

At a luncheon held during the session, V. H. Montgomery outlined the necessity of starting plans for the National PCO Convention to be held in Los Angeles in October 1949. An unofficial committee was chosen to begin organizing details: Members are: General Chairman:

V. H. Montgomery

Local Chairman: Hugh C. Smith.
Secretary-Treasurer:

Ray C. Dewey

Planning Committee: D. C. Tracy, J. Wilfred Gunn, Charles C. Delk, Clifford Hodel, Ray Millett.

E. Pa. PCA Meets

A regular meeting of the Eastern Pennsylvania Pest Control Association was held in Philadelphia's Benjamin Franklin Hotel on Thursday evening, March 11th. After dinner, Mr. David S. Loeb of Food Trade News and Mr. Edward Felbin, Philip Klein Advertising Agency, presented ideas for better pest control public relations. Ladies were invited to join the "Lady Bugs" who had their own meeting in a separate room.

Ohio Appoints Gross

Joseph Gross, graduate entomologist, has been appointed Director of Education by the Ohio Pest Control Operators Association. On his program is the establishment of a two-day short course on pest control to be held during the regular Ohio PCO convention at Columbus in December.

President Harry Studier reports that one of the most successful efforts of the Ohio group has been its cooperative purchasing plan. Over $12,000 worth of material was purchased for members in 1947 at a cost of approximately $4,000. To date, 1948 purchases have amounted to a retail value of $20,000.

Other plans include a safety program with the distribution of safety bulletins and posters to all members.

Milwaukee PCOs Listen

Glen Oderkirk of the Fish and Wildlife Service met with the Milwaukee Pest Control Operators and members of the Milwaukee Health Department on March 5th. His talk featured preliminary information on the government's National Urban Rat Control Campaign.

Maryland PCA Formed

Pest control operators of Maryland met on January 6th in Baltimore to form the Maryland Pest Control Association. The following officers were elected:

President—Eugene J. Gerberg, Insect Control and Research, Inc.

Vice President—G. Marion Stover, B&B Exterminators, Inc.

Secretary - Treasurer—J. Emory Porter, Rose Exterminator Co.

The following were appointed directors of the association: Fred Hubbel, Baltimore Fumigators; Fred W. Runge, Capitol Chemical Co.; W. A. Tilley, Home Exterminating Co.; Theodore Grahn, Theo. Meyer Est.; Joseph Plein, Reliable Exterminator Co.; and Jesse A. Jett, Vogel-Ritt of Baltimore, Inc.

New York State Pest Control Ass'n. Holds Short Course at Cornell

A SHORT course for the pest control operators of the state of New York was to have been held at Cornell University March 29-30 sponsored by the New York State Pest Control Association.

An excellent program was arranged by Dr. Charles E. Palm, Professor of Entomology at Cornell, with prominent speakers from Cornell's Entomology and Zoology departments as well as from the pest control industry.

The first day's program included a welcome address by Dr. Palm followed by an explanation of the purpose and achievements of the NY state PCA by its president, I. B. Carncross. Cornell professors Dr. W. I. Hamilton, Dr. L. B. Norton and Dr. J. E. Dewey lectured on "Rodent Control Problems" and a "Discussion of Insecticides." Dr. Hamilton is professor of Zoology, while Drs. Norton and Dewey are associate professors of Insecticidal Chemistry and Toxicology, and Insect Toxicology respectively. A dinner concluded the day's session.

During the second day a TIFA fog generator was demonstrated at the Insectary and a discussion of results obtained with a fog generator in structural pest control was lead by Dr. D. L. Collins, Office of the State Entomologist, Albany, N.Y. Cornell extension entomologist, Dr. R. W. Leiby, spoke on "Household Insect Problems as Seen by the Extension Entomologist" and Harry Linindoll, director of the N.Y. State Pest Control Association, talked about "Some Problems Facing the Pest Control Operator." Dr. Robert Matheson, Cornell, discussed "Problems relating to Mosquitoes and their Control," followed by a lecture on "Fly Control," given by Drs. H. H. Schwardt, Ithaca, and L. R. Carruth, Geneva.

Registration fee for this two-day pest control course was $12.50.

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Certification Test
for Florida Structural PC Law
Announced

John T. Creighton, Chairman of the Florida Structural Pest Control Board has asked us to publish this announcement of the next examination for certification under the Florida Structural Pest Control Law. These tests will be held at the Department of Entomology, College of Agriculture, University of Florida in Gainesville on April 21, 22 and 23. To qualify, applications must be filed with the board at least 10 days prior to the dates set for the examination.

The schedule of categories to be covered in these tests is as follows:

Category "A" — Principles of Entomology and Economic Zoology; and the Principles of Construction.
Wednesday, April 21—9:00 A.M. to 12:00 Noon
Category "B" — Termite Control and Other Wood Infesting Organisms
Wednesday, April 21—2:00 P.M. to 5:00 P.M.
Category "C" General Household Pest Control
Thursday, April 22—9:00 A.M. to 12:00 Noon
Category "D" — Rat and Other Rodent Control
Thursday, April 22—2:00 P.M. to 5:00 P.M.
Category "E" — Fumigation
Friday, April 23—9:00 A.M. to 12:00 Noon

Interested persons should write immediately to the Structural Pest Control Board, P. O. Box 2728, University Station, Gainesville, Florida, and request application blanks.

East African Pyrethrum

The following announcement is made by the Board of Trade, London, in connection with their East Africian stocks of pyrethrum:

1. Of the stocks held in East Africia, it is proposed to reserve 1,100 tons of the highest test flowers for sale, pari passu with new production of flowers.

2. A further 1,000 tons will be held in reserve in case the demand should exceed the available supply in 1948, but unless more than 700 tons of the above 1,100 tons are sold in 1948, the whole of this reserve stock will be condemned after December 31, 1948.

3. All other stocks held by the Board of Trade have been condemned and are no longer available for sale on world markets and are to be disposed of under supervision of the Pyrethrum Board of Kenya.

It will be recalled that the Board of Trade's contract with pyrethrum growers expired last December 31st and the foregoing gives the disposition of the entire stock of pyrethrum held by the Board of Trade in East Africa.

I. F. Changes Hdqrs.

The Industrial Fumigant Company announces a change of its main office from Chicago to 1020 Woodswether Road, Kansas City 6, Mo., effective March 15th. A branch office is located in Chicago at 612 North Michigan Avenue.

New DuPont Insecticide

DuPont recently announced a new insect killer described as safe to use around domestic animals and on plants.

The new product, called "Marlate" methoxychlor insecticide, DuPont says, has more knockdown power than DDT on flies, mosquitoes and other insect pests. Methoxychlor is short for the chemical name of the active ingredient, bis (methoxyphenyl) trichlorethane.

Proposed Kentucky Laws

The Kentucky legislature has before it a bill that would put strong restrictions on the sale, distribution, and use of all rodenticides. Products poisonous to domestic animals, such as those containing arsenic, strychnine, and phosphorous, cannot be sold or used. This law mentions Red Squill and its preparations as being permitted.

A bill calling for full ingredient statements on labels of insecticides, disinfectants, cleaners, soaps, and other similar products sold in Kentucky is also reported receiving favorable attention by that state's senate.

Ratfight Starts in Texas

Corpus Christi, Texas, has been extended the dubious honor (?) of being the first city selected to demonstrate effective rat control in cooperation with the National Urban Rat Control Campaign which has been launched by the government as part of the emergency food conservation drive.

Government officials hasten to point out that they don't intend to imply that Corpus Christi is the rattiest city in the country, but the campaign had to start somewhere, and Corpus Christi being the grain concentration point for South Texas could probably show the benefits of the campaign in terms of bushels of grain saved more vividly than some other city.

The city fathers haven't commented on the honor bestowed on their fair city, but they have expressed a willingness to go along with the campaign. The Corpus Christi Chamber of Commerce is also on record in support of the antirat campaign.

From Oil, Paint, Drug Reporter 2/23/28

NEW KIND OF TRAP
— Door, That is

News reaches us that in Holland all busses have a trap door in the top so that passengers can escape if the bus slips into a canal. (What a happy, carefree people those Dutch are!)

MAGIKIL ANT BAIT JELLY

Easy TO USE

KILLS ANTS

CONTAINS THALLIUM SULPHATE

Packed in Convenient Service Containers

ANT TRAPS
1, 3, & 7½ oz. Tubes
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Used professionally it assures customer satisfaction.

Preferred by discriminating PCO's.

For safety in service work use MAGIKIL ANT TRAPS.

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to Absolutely Eliminate

ROACHES AND RATS

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Phosphorus, however, remains basic in the compound because it is the most toxic chemical used in pest exterminating, being more toxic than arsenic, strychnine or thalium. Approximately one-tenth of a grain will kill a rat. Phosphorous is a slow poison, taking from 6 to 18 hours to kill. Due to its slow but positive action, the rat succumbs to this poison. He becomes very uncomfortable and, seeking fresh air and water, in most cases, leaves the premises and dies in the open.

For all species of roaches, this product is **UNEXCELLED.**

JOHN OPITZ, INC.

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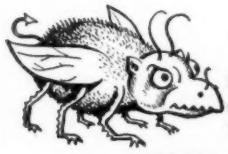

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An emulsifiable, wettable powder, ideally suited for either dust or liquid sprays. Mild adhesion; stays put — lasts long. Will not plug or clog nozzles.

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Lightweight PCO Service Case

CASE ILLUSTRATED — 18 INCHES HIGH

Carrying your equipment on the job all day can become mighty tiresome . . . but not when you carry it in this LIGHTWEIGHT PCO service case. For it's constructed of long-lasting vulcanized fibre, the best fibre material made today. And it's varnished, inside and out, for protection against chemical corrosion. Saves you labor, saves you time; no more arm-weary hours while you're making your calls.

Several standard sizes to choose from, with or without compartments. Prompt shipment from our factory. Write us today. Send us your requirements.

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SPECIAL CASES MADE TO ORDER

WHAT A SALESMAN SHOULD KNOW (cont.)

beetle, although its close chemical relative, methoxychlor (an analog of DDT) is effective against this insect. Some of these chemicals have a long residual effect, while others have little or no residual effect. In other words, although we have many new and promising chemicals for insect control, much is yet to be learned regarding proper formulations, effect on plants and on human beings, and how they can best be used.

The following are some of the more promising materials and a brief word regarding their effect on different insects.

DDT (Dichloro diphenyl trichloroethane). The most publicized organic chemical insecticide on the market. It is slow acting has a residual effect that may last for several months, is specific in its action. Very effective against insects having sensory organs on their feet, including flies, certain beetles, and many butterflies and moths. It is effective against most household pests, such as fleas, bedbugs, and roaches; stored grain insects; animal lice; and many crop pests, including most potato, onion, and cabbage insects and the coddling moth. On the other hand it is of little or no value against Mexican bean beetle, squash bug, blister beetle, red spider, and plant lice. Like most of the new organic insecticides, it is often harmful to curcubits.

Methoxychlor (Methoxy analog of DDT) In general, not as toxic to man or insects as DDT, but controls Mexican bean beetle which is uneffected by DDT.

DDD (Dichloro diphenyl dichlorocthane) . About the same insecticidal properties as DDT.

Chlordane (A chlorinated hydrocarbon with the empirical formula C10 H6 Cl8). Effective against many of the insects for which DDT is used but does not have as long a residual effect. Many household pests, especially ants, roaches, ticks, and spiders and many crop pests, especially grasshoppers and thrips are controlled with chlordane. Injures curcubits.

"Toxaphene" and "Phenotox" (A chlorinated camphene with the empirical formula C10 H10 Cl8) are trade names. It is more toxic to man than DDT or Chlordane. Highly toxic to many insects, more especially household insects, but also to many crop insects especially grasshoppers.

3422 (Aryl alkyl thionophosphate) Very quick kill and highly toxic to man as well as insects. Effective against many insects, including roaches, cabbage worms, grasshoppers, blister beetles, plant lice and mites. A most promising new material.

Benzene hexachloride (1, 2, 3, 4, 5, 6 - hexachlorocyclohexane, C6 H6 Cl6, and known also as 666) A powerful insecticide and for many insects it is more toxic than DDT. However, it leaves a musty odor and taste and is therefore objectionable in the home, in food plants, and on crops which bear fruits. It is an effective poison for roaches, grasshoppers, tomato worms, animal lice, ticks, mites and cotton boll weevil.

Hexaethyl tetraphosphate and Tetraethyl pyrophosphate are two chemicals which are very effective against red spider and plant lice. They are highly toxic to man and must be used with every precaution.

Piperonyl cyclohexenone and Piperoyl butoxide are two chemicals which have proven to be very valuable synergists with pyrethrum. Recent studies have shown that in addition to being valuable synergists that they possess appreciable toxic ingredients themselves.

"Acrylon" (Equal parts by volume of acrylonitrile and carbon tetrachloride) Especially useful for local or "spot" fumigating in mills for the control of infestations in the various units of flourmachinery. Perhaps its greatest usefulness will be in structures where it is impossible to conduct a general fumigation.

Azobenzene is a chemical fumigant developed for use in greenhouses where it seems especially useful in the control of red spider, thrips, aphids and white fly.

DID YOU KNOW (Continued)

Ants when in battle become blind with rage, biting not only the enemy but bits of earth, wood, their own companions and slaves, and have to be calmed and put back to fighting the enemy by the slaves.

Spiders oil themselves to keep from sticking to their own web.

The caterpillars of many butterflies (Lycaenids) are entirely dependent on ants to tend them. The ants build sheds over them and feed them, and the caterpillars will die if unattended.

One type of caterpillar ties the fruit onto the tree with silken threads so that the fruit cannot fall while it penetrates the stone to feed.

One type of Brazilian ant keeps a garden. The queen brings the original seeds from home in her mouth, finds a suitable place for a nest, collects leaves and moulds them into sponge-like masses which will grow her mushroom cultures. The workers carry on the culture and propagation of the garden and will actually weed out all the other fungus growths except their particular kind.

Ichneumon, a wasp can drive its hair-like egg laying device through one inch of hard wood and deposit its eggs in a grub worm. It is a mystery how the wasp knows the grub is there. (This was 20 years ago. Do they know yet? Must be radar.)

The Wolf moth larva can penetrate the hardest wood, even knots, and has been known to penetrate 1½ inches of solid lead.

If bees find a strange object in their hives which they are unable to drag out, they will seal it over entirely. They have been known to do so with mice.

Some ants are stock-tenders, building stables, standing guard against parasites, and even herding their "cattle" out to pasture. These "cattle" are caterpillars.

One type of ant is a road builder, making neat paths from feeding grounds to nests. It cuts down blades of grass, removes sticks and stones, tunnels under obstacles and even scatters sticks and bits of sand over sticky places.

Some ants can carry 50 times their own weight.

Suicide for Pest Control Operators?

BY CAL TRACY

Regional Vice-President, NPCA

RIGHTS and duties of pest control operators as individuals, in relation to each other, as members of associations as in relation to the existing laws and as members of the industry, and with the public in general, should be carefully considered. Losses, financial and physical, inconveniences, injustices, defects in our legislation and laws, industry hazards, all things that have to do with the general uplifting or building up of our industry, should in many cases be distributed as Association and Industry expenses.

In thinking of our rights and duties as pest control operators, we must remember that because we want justice, we should be all the more careful and all of us should fight very hard to do justice to others.

Since we are all human beings it is so easy to remember just what the other fellow should do, but in practice we must also do justice unto others. We should insist upon our own rights but above all we should be sure and remember our own duties. As individual pest control operators, we might all go our own merry way, and "taste a few good things in life." Excusing ourselves in a selfish way that we did not need the Associations and that the Associations were of no great benefit to us as individuals or our industry and profession, but if all individuals from the very start of pest control would have taken the different or, "selfish I don't care attitude," if there had been no concerted cooperative action by groups or associations, we could have by this time been a very sorry pest control industry indeed.

We would have had very little scientific development, no standards, ethics, and probably no respect from the public and no recognition of any kind as a profession; probably a good many of us could not have existed. Many of us would either be paupers or be in jail for working a racket. Any industry or profession that would have practiced such a doctrine of non-self help, non-cooperation and no association or group actions, would be commiting suicide.

We would be showing to the world that our industry was unfit to exist and would in a very short time be extinct.

We can commit suicide and let ourselves die out or we can wake up to the real need for association and group actions to *uplift our industry* and the profession in which we make our living. So, if as individual pest control operators of this industry who are in the science of pest control, prefer to go our own merry way, and make no effort, no sacrifices, or if we are to avoid all burdens, or risks and tasks; then the industry, the profession or the science of pest control will in the end pay the penalty for such lack of action and such vapid and ignoble efforts. And then we as individuals would be poor creatures of effortless ease, and self indulgence and so our profession should die the ignoble death that it would deserve. On the other hand, we as individual pest control operators must surely realize that the prizes worth having in life must be paid for. No task worth doing is easy. We must have the toil, the effort and the sacrifices. All pest control operators must get behind these association and group efforts.

In the pest control industry there have been troubles, differences of opinion, many men at variance with one another, and in many cases disunity. The north and the south part of the state have had their differences as to legislative affairs and association affairs; there have been personal animosities and misunderstandings; there have been some differences and misunderstandings between some in the west and some in the east or other parts of the U. S. Many of these differences and misunderstandings have been forgotten, many of the old wounds have healed and we are beginning to be united again and we are hoping for real efforts towards unity.

The war years have taught us many things. Association and group meetings have finally united many of us together. We are now making real progress, we are now having real prosperity. But there are great problems before us in the various parts of the state, or in other parts of these United States, in whatever locality we find individual pest control operators living, there seems to exist some of the same good qualities and many of the same shortcomings. Some are wise, some are foolish, with some good and some bad. But we are all human beings. While we as individual pest control operators want to insist upon our rights, in our own section, neighborhood or state, we should also be patient and considerate of one another and our problems.

We must face these problems as a unified group. We have competitor problems, association or allied industries, customer service problems, health and safety problems, experimental station and entimologist, needs for research and findings, regional conferences and clinics, association legislation and uplifting standards in our regular services and duties.

There are countless agencies, groups, industries, governmental departments, legislation lobbies and actions, etc., that work for us or against us, so that we must continually be on the alert, must protect and defend our industry or in many instances we need to act offensively and with aggressive action in order to properly protect and put our industry over as it rightfully deserves. We must not be guilty of shortsightedness or of the folly of non-preparation, or non-recognition of problems that confront our industry. We must develop, enlarge, expand, educate cooperate. We must awaken to the real needs and the real possi-

bilities in association work for our self preservation in the science of pest control.

Association work and achievements may be many. In education the training of the minds and bodies to the point of being recognized as a profession in the science of pest control. There is a need for training, manual dexterity and industrial intelligence, by means of regional conferences, college courses, research and its practical application and all means of education so as to work on a higher plane of efficiency and for higher rewards. Industry and operators must be made to realize that the sound advantages and opportunities are greater and greater.

We must drive and strive so that those in the industry and the science of pest control can live a fuller, happier and more useful life as we go along.

We teach ourselves of course, but we must also learn from others. The associations are for pest control operators and for the betterment of the operators for the purpose of uplifting the industry, for discussing and solving our varied problems. Each local association or state association can deal with the things that concern its own area, still the national pest control association has to deal with those things of a national character, which concern all of us. Our constant endeavor must be to make a working compromise and for the development of the science of pest control and to see that the rights of the public are protected, also that the liberties and rights of the individual pest control operators are protected.

It has been said that, "the farmer is a poor creature, who skins the land and leaves it worthless to his children." The same could be said of our industry or profession. We could take out of it and from it and put nothing back for this profession or industry, but we want to be a respected profession, we want to uplift the standards, the ethics, the methods and practices of our profession, not only for our own welfare, but for those that are to continue after us. We must all recognize certain facts. Men in our industry are human beings and do make mistakes. Through the age old struggle for existence, they get into difficulties, sometimes through ignorance, sometimes carelessness, or maybe sometimes willful or for one of many other reasons.

One of the jobs of the association is to try to remedy such things and help correct them. If a man stumbles, we should help him up, if he lies down, we cannot carry him or help him up if he will not be helped, but if he is a worthy person we can try our best to see that he gets a chance to show his worth. The state association must be made efficient for the work which concerns the PCO's of the state and take care of those particular and special problems.

The National association has a duty and a real worth to the PCO. It must work for what concerns our PCO as a whole. Our common interests over the entire U.S. are broad, there are vital problems which affect us all. The interests of all PCO's on a national scale can only be gathered together, studied, discussed and fully assimilated and finally guided and guarded by the national pest control association.

The betterment that we want and must seek as a whole, as an entire movement over the entire country at Washington, D. C., and on a national scale must be accomplished mainly through the national association. We must continually improve ourselves in the science of pest control, all of which has developed rapidly in the last 10 years. There has been much error and much repetition in various parts of the country, in experimental stations, in associations, and in legislative programs.

Much has been accomplished but we must have more real research and with final scientific conclusions, of proven and practical soundness.

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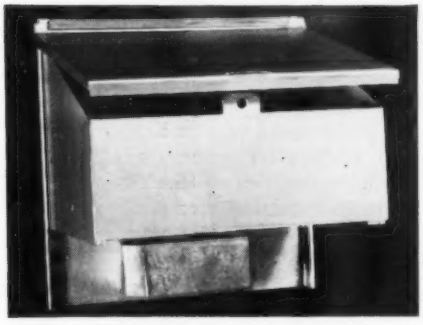

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decibel intensity (above 10-16 watts/sq. cm.); this is approximately 10,000 times more intense than necessary to cause pain to the human ear, if the waves were in the sonic range. In mechanical terms, this produces waves with an intensity of 1 watt per square centimeter.

In everyday terms, the energy emitted by this siren can set fire to a ball of cotton in five seconds when the cotton is held in the beam. It can be absorbed by tobacco in a pipe with the production of enough heat to light it in a short time. It can be absorbed by glass wool around a coffee-pot with such heat produced that coffee can be brewed in about 7 minutes. It is interesting to compare this last with the fact that it would take 75 to 20,000 years of talking to a cup of cold coffee to heat it to proper drinking temperature if all the energy of sound from the voice were absorbed by the water. In other words, in the sound-beam of the siren the fact that sound waves have energy is startlingly shown, because the energy content of such intense sounds is terrific.

In this sound-beam, at about 20,000 cycles per second, white mice were literally cooked in their fur in a little over a minute. We measured fur temperatures of about 200°F. on white mice after just ten seconds in the ultrasonic field. The body temperature rose rapidly from its normal of about 95°F. to a fever of about 110°F., usually reaching the latter figure in a little more than a minute, and the mouse died. The energy of the sound waves was simply absorbed by the fur, produced a terrific heat there, and the mouse was brought to its death temperature. Continued application of the sound waves continued the cooking process, bringing the mouse in 3 or 4 minutes to about 150°F.

If mice were exposed to the ultrasonic waves for too short a time to kill them — let us say about 45 seconds — they emerged greatly shaken and, so far as we could tell, deaf. The intense sound, apparently, shattered the ear. The external ear, which is so prominent a part of the normal mouse, shortly after the treatment became inflamed and finally degenerated, leaving a earless mouse. The picture shows two mice, the one on the right with normal ears, the one on the left with the external ears destroyed by ultrasonic treatment. This mouse is still alive today, and seems totally deaf.

Roaches Killed By Sound-beam

AMERICAN roaches also were killed by exposure to the sound beam at 20,000 cycles per second. Measurements of their internal temperature showed that they too were probably killed by heating, which in their case, was internal rather than external as in the mice. About 1½ minutes were needed for females and a longer time for males, probably related to the fact that females contain larger amounts of fatty absorbing materials, than males. Mealworms too were seemingly baked, taking only about 30 seconds exposure. When treated in bran, the bran became warm, but not hot enough to ignite, the mealworms wriggled out violently and were dead within about 15 seconds. Firebrats, likewise, were killed by the sound-beam, requiring only about 2 minutes. This relatively long time is probably due to their well-known tolerance for heat. Monarch butterfly caterpillars and other caterpillars were also killed in a short time by exposure to the beam. All these seemed, like the roaches, to die as a result of internal heating as they absorbed the sound-energy.

Blowflies and mosquitoes, on the other hand, were apparently killed by mechanical injury. The flies were obviously crushed, this taking only a few seconds, and the mosquitoes were badly damaged. In these, and in the roaches, the wings were shattered by even short exposures to the ultrasonic waves.

An interesting point noted was that groups of insects were killed more rapidly than single specimens. This seemed to be due to the heating of the small air-pockets between the insects. This effect is quite easy to demonstrate by putting the hand with the fingers close together in the ultrasonic beam. Heating of the trapped air, in this case, can cause a bad burn. Heating of the open skin, though causing a feeling of warmness, does not bring about burns. Thus any crowding or other trapping of air-pockets during exposure to the ultrasonic waves can cause rapid and intense heating and favor damage to living things.

Summarizing our experiments, then we can say that high intensity air-borne ultrasonic waves, because of their great energy content, can produce great mechanical injury to small animals or thin structures, such as wings and external ears of mice, and can be absorbed by living animals or by their external coverings with the production of heat of destructive intensity. It is worth noting that there is nothing magical about ultrasonic frequencies in these effects. We tested the siren at high intensities producing audible sound waves, and the results were the same. Obviously, ultrasonic waves are easier on the observers than sonic waves of such terrific power.

You might be interested in the effects of high intensity ultrasonic waves on man, since any application of these waves in pest control will immediately bring this problem to the forefront. We have noted the local heating and the possibility of burning in special cases. Other than these effects, some of the workers at Penn State have reported occasional feelings of dizziness or loss of equilibrium when near the siren in operation. Personally, I have never experienced these sensations. We wore protective ear-plugs while working with the siren, even though, being ultrasonic, the waves were inaudible. I have, however, been quite close to it without ear-plugs without experiencing any noticeable effects. In the sonic range, of course, the intensity is such that extreme pain is experienced, and ear-plugs are absolutely essential. Workers in experimental laboratories where jet-planes are being tested have reported dizzi-

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ness when the jets are in operation. This has been dubbed, "supersonic sickness," since it is believed to be caused by ultrasonic waves. It is at present under investigation by various aircraft companies and by the Air Force.

Value In Pest Control

THESE facts then give us reason to believe that ultrasonic waves may have value in pest control, either as repellents which are unnoticeable by man or as killing agents. But, before any practical uses come, there are certain tough problems which must be solved.

First of all, if ultrasonic frequencies are to be used as repellents, we must find the frequencies or combination of frequencies which are effective. So far the reports have been either purely fictitious or without enough supporting data to allow us to make recommendations for application. In short, if ultrasonic waves are to be used as repellents, we must find out whether or not they really repel insects and rodents.

Next, assuming that such frequencies are found, we must study the possible effects of fatigue or adaptation to these. It is a common observation that the ticking of a clock in a room is shortly forgotten as one become adapted to it, and it is only when it stops or when one listens attentively that he hears it. Insects too might be repelled on first exposure, but shortly fatigue or adapt. Of course we could interrupt the tone, but this must be tested.

Now we come to a series of general difficulties which we face whether ultrasonic frequencies are to be used for repellency or killing. The first of these is known technically as attenuation. A sound may start out very intense at the source, but it diminishes the farther from the source it goes. This is, however, only one part of the story of attenuation. The other part is more significant. As the frequency increases, the absorption of sound waves by the air increases, so that ultrasounds of 25,000 cycles, even at terrific intensities, do not travel over 1000 feet under the best conditions. This means that talk of ultrasonic death rays acting at long ranges are just so much talk, so far as we know today.

The second difficulty to be mentioned is the production of sound shadows at high frequencies. At low frequencies, as is well known, sounds go around corners, but the higher the frequency the less do they bend around corners, until, on reaching the ultrasonic stage, they do not bend around objects like ordinary sound waves, and as in the case of light, they produce shadows. It is for this reason that Drs. Allen and Rudnick and I did not quickly run out and train our siren sound-beam down a rat hole to cook the rat in his home. The waves simply would not go around the turns. Obviously, too, assuming that ultrasonic waves would prove repellent to rats, and one wanted to set up an ultrasonic-producer in a barn, he would have to have the barn clear of objects which would throw shadows. He could also, of course, place the producers so that sound shadows were eliminated, like a photographer placing his lights to get rid of light shadows.

Effect on Industry

IN this connection, it is worth noting that a few pest control men have asked me whether, if ultrasonic repellent sets become a reality, they will be out of a job. I think that what I am writing now, as well as the fact that there will always be a market for service, answers that question. It might make such terms as decibels, kilocycles, attenuation, watts, amplitude, phase, and the like, part of the stock in trade of a pest control man, but the know-how would become more important than ever, and it is that in the long run that he is paid for.

Another difficulty is that involved in producing proper loud speakers for the sending of ultrasounds. The usual speaker is made to send sonic frequencies, and much research will be needed for production of efficient transducers, as these sound-senders are called.

A final difficulty is one that has already ben suggested, namely heating. Not only does heating of the animals occur in a high intensity ultrasonic beam, but heating of other objects occurs also. How important this may be we can not even guess until we know more about our ultrasonic needs for repellency or killing of insects and rodents.

But all is not hopeless. As already suggested, the mere fact that reports of repellency by ultrasonic waves do not give us enough to say what we need for specific purposes is not too important. With careful study proper frequencies may be found. As for fatigue and adaptation, these remain to be seen. They might be important, or they might not be; we should keep them in mind and

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always be aware of the possibility of failure, but they need not stop the search.

As for the general difficulties, all is not lost there either. The problem of attenuation might be great, if great intensities are needed for repellency, but there is no indication that great intensities are needed. Audiogenic seizures caused by jingling keys can hardly be said to be caused by loud tones. Much research, also, remains to be done on attenuation in air in the ultrasonic range. While there is nothing at present to indicate other than that attenuation increases as the frequency increases, attenuation of higher frequencies in air has not actually been measured, chiefly because of the newness of ultrasonics. Further research by the specialists in acoustics should aid us here.

It seems certain also that, if needed, proper transducers can be produced. After all, Caesar did not have good phonograph needles, simply because he had no need for them, and the production of good needles has not been a simple matter, but with the need, the progress has been great. As for sound shadows, elimination of these, if necessary at all, is merely a matter of proper placement of apparatus. So, if we can find practical uses for ultrasonics in pest control, there is no reason to believe that the physicist and engineer will not be able to solve the difficulties standing in the way of production or application.

There is a point worth mentioning that is in favor of ultrasonic waves over other insecticides or repellents. These waves not only are not stopped by solids or liquids, they actually can travel as well, or in some cases even better, through solids and liquids than through air. This opens up interesting prospects for their use in control of powder-post beetles or termites, for instance. In this connection it is worth noting that the more crowded the insects, the more vulnerable to ultrasonic waves. The fact that the queen of a termite colony is probably the most crowded individual in the colony immediately comes to mind. The only question is how to get the ultrasonic hot-foot to her.

Use In Stored Products

JUST a brief statement of the possible uses of ultrasonics in pest control, then, we can mention termite and powder post beetle control, destruction of stored products pests, such as mealworms, repellency of rats, mice, flies, mosquitoes, roaches. Perhaps we should say either repellency, or—remembering that wild rats attack the sound source and may be attracted to it — attraction. Confidentially, the Pied Piper of Hamlin may have been on the beam with his ultrasonic flute. Only future research can tell.

And it is that final thought that I want to leave. As we continue our research on ultrasonics, much of it will seem to be of a non-practical nature. But I know of no piece of research, no matter how apparently impractical it may seem, which is not useful. It is not always possible to guide research so that we come out with the gadgets for which we hope, but the contribution to human knowledge that comes from any research project is the important consideration. So-called "impractical" research by physicists, biologists and chemists on ultrasonic waves has the pest control possibilities that I have enumerated, but, far more important, it increases our knowledge and thus makes possible advances in all human endeavor.

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(Note: This is not intended to be a complete bibliography. These references are either original sources of facts presented in this review or are good sources of references to work on some phase of ultrasonic research for those who may be interested in looking up the original technical literature).

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50-gal. drums	3.95 per gal.

50-E Chlordane Emulsion Concentrate

To mix with water. For industrial and vegetation use. Kills roaches, waterbugs, grasshoppers, mites, chiggers, red bugs, and certain other insects. CONTAINS 4 lbs. CHLORDANE PER GALLON.

12/1 qts. to cs.	$32.00 per cs.
4/1 gal. to cs.	10.00 per gal.
5-gal. cans	9.75 per gal.
50-gal. drums	9.50 per gal.

2% Refined Chlordane Spray

Ready to use in stainless, deodorized petroleum solvent.

5-gal can	$1.10 per gal.
50-gal. drum	.95 per gal.

Technical Chlordane Agricultural Grade

700-lb drum	$1.70 per lb.
5-gal. (65 lbs. net wt.)	2.00 per lb.

Technical Chlordane Refined Grade

Drum (700 lb. net)	$1.85 lb.
5-gal. (65 lb. net)	2.25 lb.
1½-gal. (20 lb. net)	2.50 lb.

5% Chlordane Dust

25-lb. bag	$0.19 per lb.
100-lb. drum	0.16 per lb.

50% Chlordane Wettable Powder

6/4 lb bags to case	$1.19 per lb.
100-lb. drum	1.17 per lb.

OUR GUARANTEE: All Cook formulations are guaranteed to be chemically and biologically standardized.

Mail Orders Direct to

COOK CHEMICAL COMPANY
2020 Wyandotte
KANSAS CITY 8, MISSOURI

FREIGHT PAID ON QUANTITIES OF 100 LBS OR MORE